ORAL ARGUMENT NOT YET SCHEDULED

DOCKET No. 11-1449

UNITED STATES COURT OF APPEALS

FOR THE DISTRICT OF COLUMBIA CIRCUIT

SHIELDALLOY METALLURGICAL CORPORATION

Petitioner,

v.

UNITED STATES NUCLEAR REGULATORY COMMISSION AND THE UNITED STATES OF AMERICA,

Respondents.

ON PETITION FOR REVIEW OF A FINAL ORDER BY
THE UNITED STATES NUCLEAR REGULATORY COMMISSION

SUPPLEMENTAL APPENDIX

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July 19, 2012

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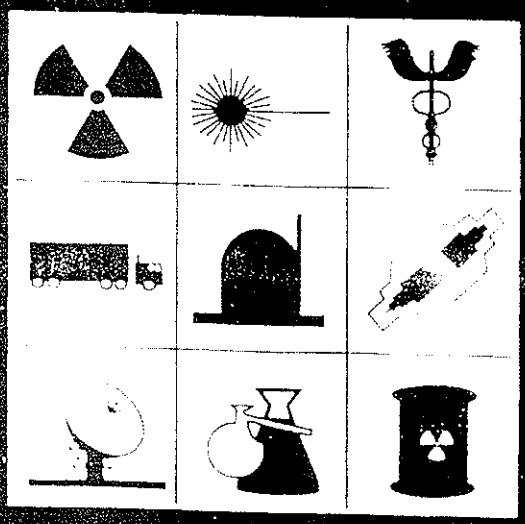
HANDBOOK OF HEALTH PHYSICS AND RADIOLOGICAL HEALTH

THIRD EDITION



Edited by
Bernard Shleien
Lester A. Slaback, Jr.
Brian Kent Birky

Table 8.1 Selected Alpha Emitters by Atomic Number[a] (Continued)

Radionuclide	Half Life	Isotopic Abundance (%)	α Emission (when not 100%)	Energy (MeV)
^{225}Ac	10.0 d			5.829(51.6%), 5.793(18.1%), 5.791(8.6%), 5.731(10%), 5.637(4.5%), others
^{227}Th(Rd Ac)	18.718 d			6.038%(24.5%), 5.978(23.4%), 5.757(20.3%), 5.714(4.9%), 5.710(8.2%), others
^{228}Th(Rd Th)	1.913 y			5.423(72.4%), 5.339(27%)
^{229}Th	7340.0 y			5.050(5.2%), 4.968(6.0%), 4.901(10.2%), 4.845(56.2%), 4.814(9.3%), others
^{230}Th(Io)	7.54×10^4 y			4.688(76.3%), 4.621(23.4%)
^{232}Th(Th)	1.405×10^{10} y	100.		4.010(77%), 3.952(23%)
^{231}Pa(Pa)	3.276×10^4 y			5.057(11%), 5.028(20%), 5.011(25.4%), 4.950(22.8%), 4.736(8.4%), others
^{230}U	20.8 d			5.889(67.4%), 5.818(32%), others
^{232}U	68.9 y			5.320(68.6%), 5.264(31.7%)
^{223}U	1.592×10^5 y			4.824(82.7%), 4.783(14.9%), others
^{234}U(UII)	2.454×10^5 y	0.0055		4.775(72.5%), 4.724(28.4%)
^{235}U(AcU)	7.037×10^8 y	0.7200		4.599(5%), 4.556(4.2%), 4.400(55%), 4.365(17%), 4.218(5.7%), others
^{236}U	2.342×10^7 y			4.494(74%), 4.445(26%)
^{238}U(UI)	4.468×10^9 y	99.2745		4.196(77%), 4.147(23%)
^{237}Np	2.14×10^6 y			4.873(2.6%), 4.788(47%), 4.771(25%), 4.766(8%), 4.640(6.2%), others
^{236}Pu	2.851 y			5.768(68.1%), 5.721(30.6%)
^{238}Pu	87.74 y			5.499(70.9%), 5.456(29%)
^{239}Pu	2.409×10^4 y			5.156(73.1%), 5.143(15%), 5.105(11.8%)
^{240}Pu	6563.0 y			5.168(73%), 5.124(27%)
^{242}Pu	3.763×10^5 y			4.901(78%), 4.856(22.4%)
^{244}Pu	8.26×10^7 y			4.589(80.5%), 4.546(19.4%)

Decommissioning Plan for the Newfield Facility

Submitted by:

Shieldalloy Metallurgical Corporation
12 West Boulevard, Post Office Box 768
Newfield, New Jersey 08344
(856) 692-4200

Report No. 94005/G-28247, (Rev. 0)
August 28, 2002

1.4 Nature and Extent of Contamination

Subsurface soil contamination, in the form of ferrocolumbium slag, is present in the Storage Yard, and at a number of locations throughout the Newfield plant where slag was used as fill. Ferrocolumbium standard slag, ferrocolumbium high-ratio slag, and columbium nickel slag generated from the D111 and D102 smelting operations consist of solid, non-combustible material with the consistency of vitrified rock. All three slag types were maintained separately from the others at their respective points of generation and are transported in trucks from D111 and D 102 to the Storage Yard. There are approximately 20,000 cubic meters of ferrocolumbium slag (high ratio and standard) in the Storage Yard. In addition, baghouse dust was transported by truck to the Storage Yard. Approximately 20,000 cubic meters of baghouse dust are currently in the Storage Yard.

The only areas within the Newfield plant property lines where residual radioactivity exists in surface soils, other than in the Storage Yard, are the concrete pads that housed the former AAF and Flex-Kleen Baghouses. In addition, residual radioactivity was identified in the Hudson's Branch watershed in the late 1980's. The Hudson's Branch, an intermittent, slow-moving tributary of Burnt Mill Branch in the Maurice River Basin, is the predominant surface water body in the vicinity of the plant. It borders the southern boundary of the property, where it flows from east to west.

The only buildings that contained systems and equipment for processing source material were D-111, the Flex-Kleen Baghouse, the AAF Baghouse, and D-102/112. The AAF Baghouse was demolished and released for unrestricted use in calendar year 2001. The Flex-Kleen Baghouse, D-111 and D-102/112 were decommissioned in calendar year 2002, and the final status survey report is soon to be submitted to the USNRC. Consequently, there are no longer any contaminated systems or equipment to be addressed in the site-wide decommissioning effort.

1.5 Selected Decommissioning Objective

Prior to terminating License No. SMB-743, SMC intends to move all residual radioactive materials at the Newfield Facility to the Storage Yard, which is located on the eastern boundary of the plant. There it will be graded, topped with the excavated soils from elsewhere on the plant, capped in place, and subject to long-term maintenance and monitoring. This *in situ* decommissioning methodology has already received federal and state (Ohio) regulatory acceptance at a site that performed similar operations, and with similar quantities/forms of residual radioactive materials.[1,2]

[1] U. S. Nuclear Regulatory Commission, NUREG-1543, "Environmental Impact Statement; Decommissioning of the Shieldalloy Metallurgical Corporation Newfield, Ohio Facility", July, 1996.

[2] PTI Environmental Services, "Remedial Investigation and Feasibility Study at the Shieldalloy Metallurgical Corporation Site in Newfield, Ohio", September, 1996.

1.8 Restrictions Used to Limit Radiation Doses

After remediation activities are complete, a deed notice will be filed with Gloucester County that prohibits or in some way restricts agricultural, residential, and industrial activities on the restricted release areas of the site. At this time, there are no plans for re-development of the restricted release areas after license termination, other than to complete and maintain a wildlife preserve with nature trails. The final decision(s) on this issue will be made prior to license termination.

SMC intends to retain title to the property until such time as all remaining plant operations cease. At that time, SMC intends to turn portions of the property over to the Borough of Newfield, to Gloucester County, or to the State of New Jersey, along with all funds designated for long-term (1000-year) maintenance of the restricted release area as a wildlife sanctuary. The final decision(s) on the title recipient and areas to be transferred will be made prior to license termination.

1.9 Summary of Public Participation Activities

SMC will solicit local input as it plans and implements its cleanup and management of the residual radioactivity at the site. SMC will establish a Restoration Advisory Board (RAB) as a voluntary advisory group. The RAB members include individuals from state and county regulatory agencies, as well as residents from the county. All of the RAB meetings will be open to the public, and SMC will solicit comments from the general public in addition to the RAB members at the RAB meetings.

1.10 Proposed Initiation and Completion Dates

The duration of regulatory review of this decommissioning plan, and exchange of additional information solicited by the USNRC, is unknown at this time. However, full implementation of the Plan will be completed within two years after its approval by the USNRC.

1.11 Request for License Amendment

SMC requests that the license be amended to incorporate this decommissioning plan as provided in the following sections.

ensure compliance with the terms of the permit, as appropriate. If violations of the permit conditions are identified, SMC retains the right to suspend the site activities of the individuals until appropriate corrective action is taken. SMC will conduct a formal review of the effectiveness of any permits and the effectiveness of the land use controls every two (2) years.

- Records of visitors to the site will be prepared and maintained by SMC. SMC will also maintain a record of its review of the effectiveness of these controls for the duration of its ownership of the property.

SMC intends to retain title to the property until such time as all remaining plant operations cease. At that time, SMC intends to turn portions of the property over to the Borough of Newfield, to Gloucester County, or to the State of New Jersey, along with all funds designated for long-term (1000-year) maintenance of the restricted release areas as a wildlife sanctuary. The final decision(s) on the title recipient and areas to be transferred will be made prior to license termination.

16.3 Maintenance

SMC will patrol and inspect the perimeter of the property and the entire area of the former Storage Yard at least once per quarter. These inspections will be documented to show the inspection date, the inspector, and the location of any damage identified during the inspection. SMC will repair any damage, maintain all necessary roads, road shoulders, low water crossings, bridges, nature trails, and culverts and provide access control signs at specified locations. In addition, SMC will maintain the barricading and marking of all roads surrounding or approaching the former Storage Yard.

16.4 Obtaining Public Advice

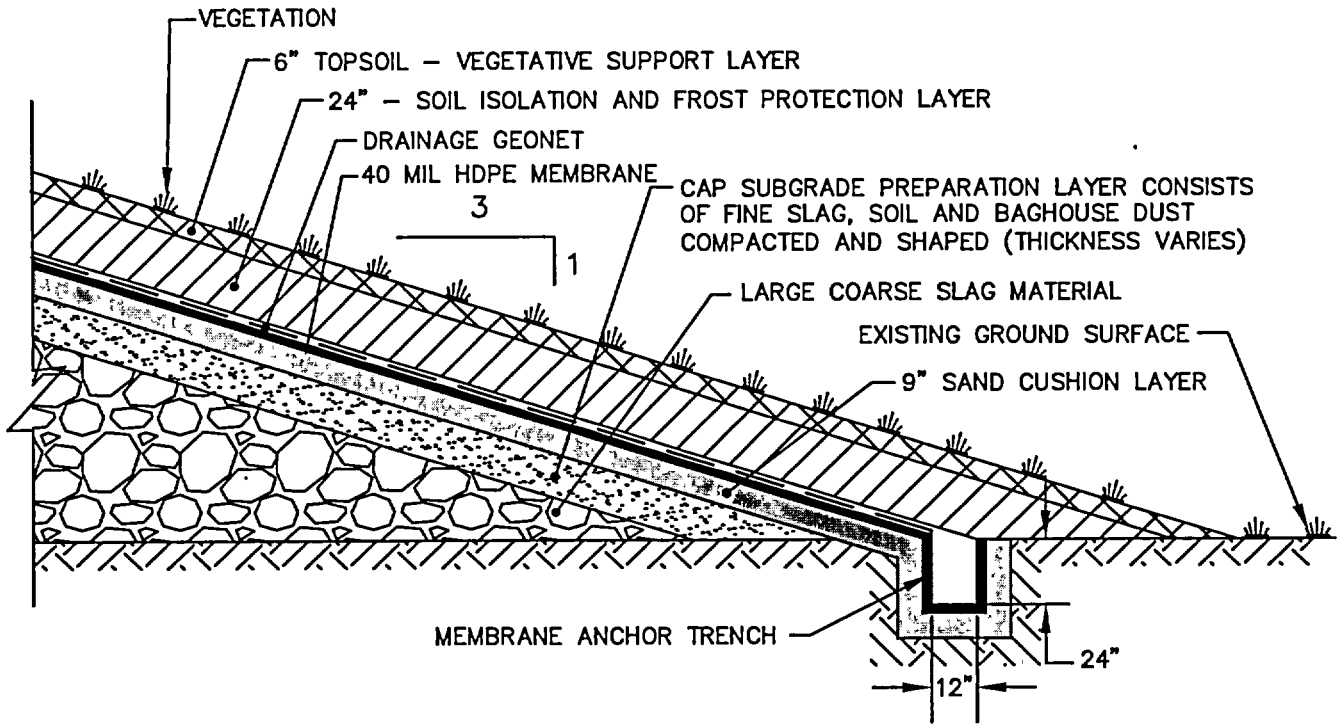
SMC will solicit local input as it plans and implements its cleanup and management of the residual radioactivity at the site. SMC will establish a Restoration Advisory Board (RAB) as a voluntary advisory group. The RAB members include individuals from state and county regulatory agencies, as well as residents from the county. All of the RAB meetings will be open to the public, and SMC will solicit comments from the general public in addition to the RAB members at the RAB meetings. Meeting minutes are documented and included in the SMC Administrative Record. It is anticipated that the meetings of the RAB will held each quarter during the planning and implementation phase. After this decommissioning plan is implemented and the license is terminated by the USNRC, the RAB will meet at least once per year.

The meetings will discuss the three aspects of the proposed SMC institutional controls that are identified in 10 CFR 20. 1403(d), specifically:

- Whether the institutional controls provide reasonable assurance that the license termination criterion (TEDE) from residual radioactivity will be met;

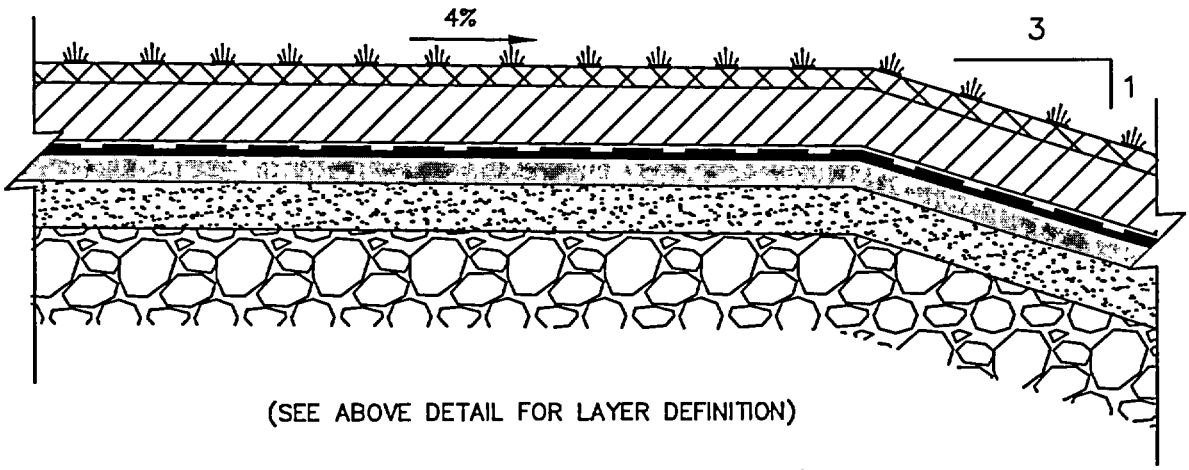
- Whether the institutional controls will be enforceable;

Figure 18.10 - Cap Construction Detail



TYPICAL CAP SIDE SLOPE DETAIL

N.T.S.



(SEE ABOVE DETAIL FOR LAYER DEFINITION)

TYPICAL CAP TOP DETAIL

N.T.S.

TRC
Customer-Focused Solutions

5 Waterside Crossing
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL
NEWFIELD, NEW JERSEY

FIGURE 18.10

CAP CONSTRUCTION DETAILS

Date: 08/02 | Project No. 37149-0000-00007

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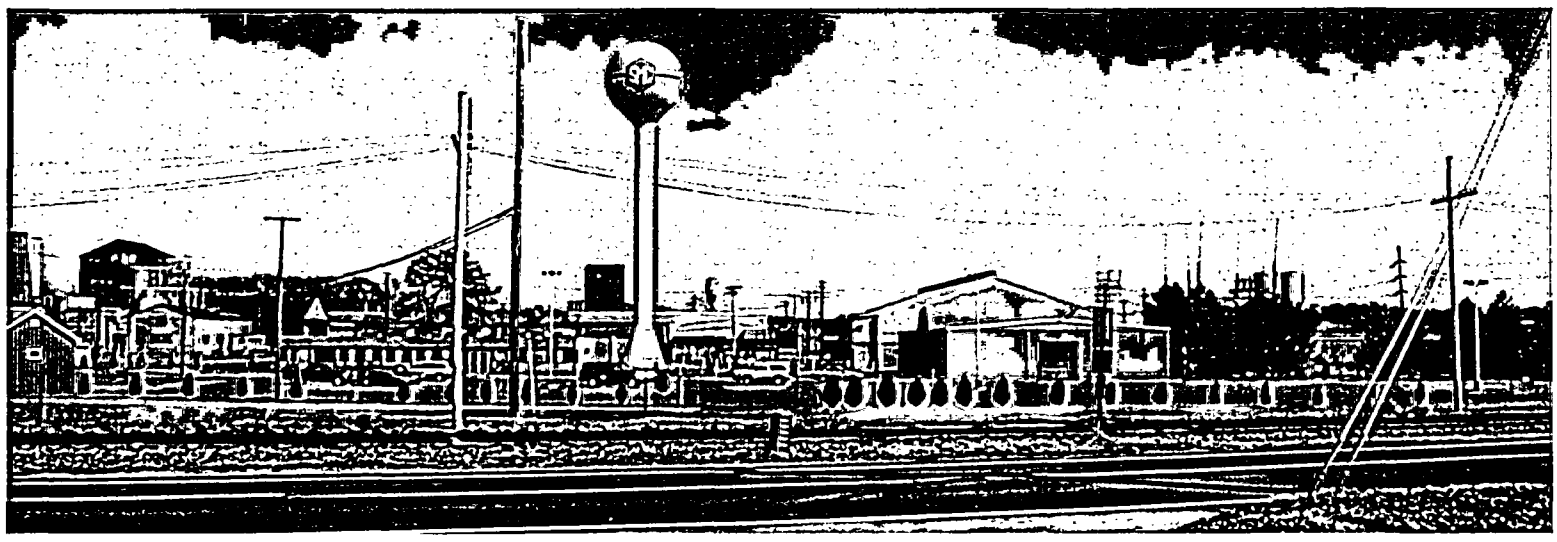

DECOMMISSIONING PLAN

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Volume I
Text, Tables and Figures

Volume II
Appendices 19.1 through 19.8

Volume III
Appendix 19.9 Environmental Report

Prepared by

Integrated Environmental Management, Inc.

and

TRC Environmental Corporation

Revision 1: October 2005

Decommissioning Plan for the Newfield Facility

Submitted by:

Shieldalloy Metallurgical Corporation
35 South West Boulevard
Newfield, New Jersey 08344
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Report No. 94005/G-28247, (Rev. 1)
October 21, 2005

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1 EXECUTIVE SUMMARY

1.1 Introduction

This Decommissioning Plan (Plan) describes the radiological remedial actions that will be implemented in order to permit the Shieldalloy Metallurgical Corporation (SMC) radioactive materials license to be amended to a "long term control", or LTC license. The following is the name and address of the licensee and owner of the site:

Shieldalloy Metallurgical Corporation
35 South West Boulevard
Newfield, New Jersey 08344

The location and address of the site itself is also at:

Shieldalloy Metallurgical Corporation
35 South West Boulevard
Newfield, New Jersey 08344

Once the applicable radiological release criteria and the conditions of this Plan have been met, an amendment of radioactive materials license number SMB-743 into a LTC license will be solicited. The decommissioning objective is to terminate the license under "unrestricted use" conditions for the preponderance of the site, and issue a LTC license under "restricted use" conditions for a small portion of the site. As such, this plan also contains conditions and actions that will be taken in order to maintain radiation exposures to the public as low as is reasonably achievable.

1.2 Site Description

Shieldalloy Metallurgical Corporation (SMC) operates a manufacturing facility located at 35 South West Boulevard in Newfield, New Jersey. During the ferrocolumbium manufacturing process, the facility generated slag, dross, and baghouse dust. The primary portion of the site, consisting of the manufacturing facilities and their support areas, covers 67.7 acres. An additional 19.8 acres of farmland, located approximately 2,000 feet southwest of the primary site in Vineland, Cumberland County, New Jersey, are also owned by SMC. The immediate environs around the site is industrial, and the nearest off-site resident is located approximately 28 meters (100 feet) from the property.

1.3 Summary of Licensed Activities

Metal and metal alloy manufacturing operations at the Newfield site began in the late 1950's and early 1960's. An application for ores that contained source material was sent to the Atomic Energy Commission in 1963. The license was issued shortly thereafter, and later re-issued by the U. S. Nuclear Regulatory Commission (USNRC) as License No. SMB-743, which authorizes possession of up to 303,050 kilograms of thorium in any chemical/physical form, and up to 45,000 kilograms of uranium in any chemical or physical form.

In late 2002, operations involving source material ceased. As of October 21, 2005, the SMC inventory of licensed materials was at 96.8% of the thorium limit and 87.6% of the uranium limit. The most recent amendment of SMB-743 was issued on November 26, 2002, and the license expiration date was October 20, 2002. The license is currently being held under timely renewal notice.

1.4 Nature and Extent of Contamination

One of the materials received, used and stored by SMC contains radioactive material classified as "source material" pursuant to Title 10, Code of Federal Regulations, Part 40. This material is called pyrochlore, a concentrated ore containing columbium (niobium). Pyrochlore contains greater than 0.05% of natural uranium and natural thorium, thus a source material license for its possession and use is required.

The majority of the licensed radioactive material inventory at the plant currently consists of the slag generated during former D11 production department operations, and dust from the former D11 baghouses. After processing of consumable pyrochlore ore and other feed materials for ferrocolumbium and other metallurgical operations, greater than 99% of the radioactive species remained in the slag and, to a much lesser extent, in the baghouse dust. Surface and subsurface soil contamination, in the form of ferrocolumbium slag and baghouse dust, is present in the Storage Yard, and at a number of locations throughout the Newfield plant.

Ferrocolumbium standard slag, ferrocolumbium high-ratio slag, and columbium nickel slag from the former D111 and D102 smelting operations are solid, non-combustible materials with the consistency of vitrified rock. All three slag types were maintained separately from the others at their respective points of generation and were transported in trucks from D111 and D 102 to the Storage Yard where they remain segregated. In addition, baghouse dust was transported by truck to another location within the Storage Yard. Table 17.1 is a summary of the volumes of residual radioactivity currently present at the site and Table 17.7 shows the radiological source term.

The only other area within the Newfield plant property lines where residual radioactivity has been identified is in the Hudson's Branch watershed. The Hudson's Branch, an intermittent, slow-moving tributary of Burnt Mill Branch in the Maurice River Basin, is the predominant surface water body in the vicinity of the plant. It borders the southern boundary of the property, where it flows from east to west. Other than documenting site-wide radiological conditions as part of the final status survey effort, there are no other contaminated systems, equipment or land areas at the site to be addressed in this decommissioning effort.

1.5 Selected Decommissioning Objective

With the approval of this Decommissioning Plan, SMC will consolidate all licenseable residual radioactive materials at the Newfield site to a portion of the existing Storage Yard, located on the eastern boundary of the plant. There it will be shaped, graded, covered with an engineered barrier and subject to long-term maintenance and monitoring. This *in situ* decommissioning methodology

has already received federal and state (Ohio) regulatory acceptance at a site that performed similar operations, and with similar quantities/forms of residual radioactive materials.[1,2]

After all consolidation and barrier construction activities are complete, a final status survey will be performed, the results of which will be documented in a comprehensive report. Included therein will be a demonstration that the site, in its entirety, meets the decommissioning objective. The majority of the site may then be released for unrestricted use, subject to regulatory verification. However, the portion that contains the engineered barrier will be held under restricted use conditions, with License No. SMB-743 then amended into a Long Term Control (LTC) license. The conditions of the LTC license will include long-term maintenance of the engineered barrier, monitoring of radiological conditions throughout and around the restricted area, deed notices, a Long Term Control Plan (LTC Plan) that describes all post-remediation activities, and financial assurance sufficient to ensure the provisions of the LTC Plan will be implemented for at least 1,000 years.

1.6 Summary of Radiation Dose Analysis

The decommissioning alternative for the Newfield site is to consolidate residual slag, contaminated soil, baghouse dust and demolition rubble (concrete) into a single pile that is capped with an engineered barrier such that the potential exposure of members of the public to radiation and radioactive materials is minimized. That portion of the property will be subject to restricted use conditions, with the remainder of the property released for unrestricted use.

A radiation dose analysis was performed to ensure the Derived Concentration Guideline Levels (DCGL's) for the unrestricted portion of the site do indeed meet the criteria for unrestricted release as specified in 10 CFR 20.1402 (i.e., 25 millirem TEDE).[3] An analysis of the radiation dose associated with the restricted portion of the site was also performed in order to ensure the 10 CFR 20.1403 dose limits will be met when all institutional controls are in place and in the extremely unlikely situation when institutional controls (and subsequently physical controls) fail. With few exceptions, reasonably likely exposure scenarios were evaluated. For the exceptions, the scenarios are considered to be unlikely but were evaluated in response to input from regulators and members of the public.

The estimates of peak mean dose to the critical exposure groups for all scenarios were derived using industry-standard computer-based modeling tools specifically designed to assess exposures to residual radioactivity. Conservatism was been built into the modeling by conscientiously selecting

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[1] U. S. Nuclear Regulatory Commission, NUREG-1543, "Environmental Impact Statement; Decommissioning of the Shieldalloy Metallurgical Corporation Newfield, Ohio Facility", July, 1996.

[2] PTI Environmental Services, "Remedial Investigation and Feasibility Study at the Shieldalloy Metallurgical Corporation Site in Newfield, Ohio", September, 1996.

[3] The Derived Concentration Guideline Levels, or DCGLs, were determined pursuant to the recommendations of NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

annual dose occurs in the first year after deposition, and decreases each year thereafter, regardless of the surface soil erosion rate used. The other layers, the unsaturated zone and the saturated zone exhibited the same characteristics as those described in the restricted area. The input parameters used for the unrestricted area physical characteristics are described in 5.7.

5.2.2.2 Values Used to Describe the Restricted Area

Conceptually, the restricted area at the Newfield site after decommissioning is complete will be composed of four "layers", all of which are important to the dose modeling objective. These are:

- Engineered Barrier Layer - a thick layer of unimpacted native soil, a geomembrane liner, topsoil and vegetation brought onto the site to form a cap over the contaminated zone and underlying waste layer;[92]
- Contaminated Zone Layer - a layer generally lying just beneath the engineered barrier in which radionuclide-bearing materials are consolidated;
- Undisturbed Surface Layer - a relatively thick, dense, undisturbed native deposit of gravel/sands of the Bridgeton Formation (thickness ranging from 8 to 10 feet), underlain by the fine- to coarse-grained sands of the Cohansey Sand; and
- Saturated Zone Layer - the saturated Cohansey Sand to the depth of the confining Kirkwood formation (i.e., 120 feet or more).

The various parameters describing the composition in each "layer" are defined within RESRAD with probabilistic variables included in order to account for the variability and uncertainty inherent in hydrogeological features. The parameters defining each layer used as input to the code are described in detail in the subsections that follow.

5.2.2.2.1 Engineered Barrier Layer

The engineered barrier overlies the radionuclide-bearing consolidated material. It is comprised of soil and geomembrane membrane cap made of native materials brought onto the site and installed. The thickness of the engineered barrier is one (1) meter. A triangular distribution with a central tendency value of one meter and a minimum and maximum of 0.9 and 1.2 meters, respectively, are used to represent the thickness of this layer in the RESRAD model.

The engineered barrier incorporates a geomembrane to minimize the infiltration of water from precipitation. Additional information on the characteristics and longevity of the geomembrane is provided in Sections 5.4.3.2 and 8.3.3. The soil density of the cover is assumed to be equivalent to tat of native soil in the region (1.3 g/cm^3). When modeling the subsurface-soil source term in RESRAD, this layer is identified as the "cover layer" since it overlies the contamination zone. Cover degradation is accounted for in RESRAD by a surface soil erosion rate parameter (VCV). The value

[92] The engineered barrier includes a geomembrane to divert surface water.

to some extent with soil type. Evapotranspiration rates in the Newfield region are estimated to be approximately 24 inches per year , corresponding to a most likely evapotranspiration coefficient of approximately 0.625 (average annual precipitation in the region is 42.05 inches).[146,147]

The evapotranspiration coefficient is conservatively represented with a uniform distribution ranging between 0.3 and 0.9 which is a greater range than recommended by RESRAD. SMC determined that the national average of 0.5 is appropriate for the Newfield site.

Wind Speed

Average annual wind speed is used to calculate the dose from the inhalation pathway. The wind speed is used to transport airborne dust generated on site in a standard air dispersion model. Through the transport calculations, the radioactive fraction of the total dust loading in air is derived. The fraction is then used to calculate particle inhalation intake.

While wind speeds do vary from day-to-day and season-to-season, the annual average wind speed is reasonably steadfast. Data from the National Climate Data Center from Philadelphia, Pennsylvania were reviewed from 1971 through 2000. The mean annual wind speed was reported to be 9.6 miles per hour (4.3 meters/sec). Sensitivity analysis shows that the inhalation pathway is insensitive to this parameter because, the residual radioactivity is effectively isolated by the covering layer such that radioactive particle suspension is minor. As a result, the inhalation pathway is not a significant contributor to total annual dose. Wind speed is represented with the RESRAD default (4.25 m/sec), bounded log-normal-N distribution.

Runoff Coefficient

The runoff coefficient is one of a number of parameters used to calculate the amount of water that is allowed to enter the contaminated zone and ultimately an estimate of the radionuclide leaching from the contaminated zone. It is the fraction of precipitation that does not penetrate the top soil layer; the lower the fraction, the more water is allowed to co-mingle with the contaminated zone. The runoff coefficient (RUNOFF) varies with topography, precipitation patterns in the region, and soil type. The runoff coefficient is 1 when a geomembrane is used.

Runoff coefficient is represented with the RESRAD default parameter distribution, a uniform distribution ranging between 0.1 and 0.8 (10% to 80% of precipitation runs off without penetrating the surface). Considering the mounded topography of the site and the presence of the engineered barrier over the consolidated radioactivity, the true range is likely to be much narrower and near the maximum value (80%) considered in the probability distribution.

SMC has designed the engineered cover to incorporate a 40 mil thick high density polyethylene geomembrane that is suitable for preventing surface water from percolating through the slag in the

[146] Yu, C, et al, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil*, ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois, April, 1993.
[147] National Climatological Data Center, 1940 through 2003 (Philadelphia).

Storage Yard. Geomembranes are estimated to have a service life that is in excess of 1,000 years.[148] Service life was defined by the USEPA as equal to the half-life of the liner where there is more than 50% reduction in the specific design properties such as tensile modulus, break stress, break strain, and impact strength. Based on experiments conducted under simulated landfill liner conditions by USEPA contractors, the time to deplete the antioxidant additives was approximately 200 years, the time required to induce the degradation of the polymer was 20 years and 750 years was required to reach 50% degradation of the polymers. The radiation dose is insensitive to the runoff coefficient because the geomembrane liner is in place and is effective to minimize the amount of water that co-mingles with the slag.

Depth of Soil Mixing Layer

This parameter (DM) is used in calculating the depth factor for the dust inhalation and soil ingestion pathways and for foliar deposition for the ingestion pathways. The depth factor is the fraction of resuspendable soil particles at the ground surface that are contaminated, which is calculated by assuming that mixing of the soil will occur within a layer of thickness, DM, at the surface. The RESRAD default distribution (triangular) and range (0 to 0.6 m) was used.

Cover Depth (Thickness)

When modeling the source term, the cover depth (thickness) is a key parameter in assessing the protectiveness of the chosen decommissioning alternative as it provides a barrier to potential physical contact with residual radioactivity in the slag materials located within the cell, and a substantial degree of gamma radiation attenuation for the penetrating gamma radiation exposure pathway, the dominant, or critical dose pathway. RESRAD does not suggest a default probability distribution for cover depth (COVERO) as it is dependant upon site-specific conditions and for the unrestricted area, does not exist at all. Thus, SMC has conservatively chosen to represent this parameter with a triangular distribution ranging between 0.5 and 1.2 meters thick and with a most likely value of 1 meters (3.3 ft.). This representation is conservative in that the thickness value used does not include the topsoil layer to support natural succession vegetation as an erosion control mechanism. Sensitivity analysis reveals that the "cover penetrating gamma radiation dose" pathway, and as a result the total annual effective dose equivalent, is sensitive to this parameter.

Cover Soil Density

The engineered cover is comprised of a combination of soil and the geomembrane. The soil density at the site was measured to arrive at a site-specific estimate of the soil density of both the cover material and the undisturbed surface layer. The measured soil density was found to be 1.9 g/cm^3. Sensitivity analysis showed that annual dose was insensitive to a wide range of soil densities. Since site-specific data was available for the materials at the site, these were used to describe the density of the cover soil layer. Cover soil density (DENSCV) was represented with a truncated normal distribution (the RESRAD default). The mean was set equal to the measured density of 1.9 g/cm^3

[148] U.S. Environmental Protection Agency, *Assessment and Recommendations for Improving the Performance of Waste Containment Systems*, USEPA 600-R-02-099, December, 2002.

traditional compliance measure, peak mean annual dose. In addition, the deterministic estimate of projected annual dose is provided for comparison.

The parameters used to perform the assessment were selected to represent the critical exposure group (analogous to the Reasonable Maximum Exposure concept), and as such already overstate the expected dose to the average receptor at the Site. Results of both the deterministic and probabilistic dose modeling including an evaluation of the uncertainty analyses are presented in the sections that follow.

5.5 Results

The RESRAD code was iteratively run for each of the selected scenarios to arrive at the highest uniform concentration of residual radioactivity in soil that results in a peak mean annual dose estimate to a single receptor in the critical exposure group that is equal to the regulatory limit of 25 mrem/year for scenarios where the controls are in intact and less than 100 mrem/year if the controls should fail.[157]

The computer code was set up to model each scenario with the input parameters identified and explained previously in this Chapter. A separate set of soil release criteria are presented for each scenario and for each source term. The following subsections present the results of the dose modeling, relating residual radionuclide concentration to potential future doses in each of the scenarios evaluated.

5.5.1 DCGL for Unrestricted Areas

The DCGLs provided in Table 17.6 reflect the concentration of radionuclides in soil that may be present outside of the restricted area to ensure a maximum exposure of less than 25 millirem per year over background. The presence of these isotopes will be verified after the remediation is completed and the final status survey is implemented. As described in Section 5.3.1, an industrial worker scenario was used to develop the DCGLs. The RESRAD summary report is provided in Appendix 19.5 (Newfield 3005006.rad).[158]

The primary isotopes of concern at the SMC site are Thorium-232 in equilibrium with its decay progeny(^{232}Th+D) and Uranium-238 in equilibrium with its decay progeny (^{238}U+D). Thorium-232 reaches secular equilibrium with its decay progeny in approximately ten (10) half lives of the longest lived progeny, ^{228}Th; secular equilibrium is reached in approximately 20 years.[159] The slag is at least 20 years old and assumed to be in secular equilibrium; this assumption is confirmed by analytical data provided in Chapter 4 of this Plan (see Table 17.7). As a result, a DCGL is established for ^{232}Th

[157] The USNRC separates institutional controls from engineered controls. Therefore, institutional controls are assumed to fail instantly, along with any maintenance, but engineered controls would degrade over time without monitoring and maintenance.

[158] The DCGLs for surfaces are shown in Table 17.11.

[159] The halflife of ^{228}Th is 1.9 years.

and the progeny. The concentration of each isotope in the decay chain is assumed to be equal to the greatest concentration reported for any isotope in the decay chain.

Uranium 238 is present in equilibrium with its decay progeny. The DCGL established for ^{238}U applies to any isotope in the decay chain. If analytical data indicates that ^{238}U is not in equilibrium with its decay progeny, a limit of 21 pCi/gram limit applies to ^{238}U and the DCGL for the detected progeny is limited to 9.8 pCi/gram, the limit for ^{238}U+D.

The RESRAD code was used to generate DCGLs in the soil by inputting unit activity concentrations and running the code to determine the resultant dose rate. This dose factor in millirem/year per pCi/g is divided into the release criteria to yield the DCGL. For ^{232}Th+D, the concentration of 1 pCi/g was used for the key isotopes, ^{232}Th, ^{228}Th and ^{228}Ra. For ^{238}U+D, the ratios of the uranium isotopes, ^{238}U, ^{235}U and ^{234}U, were used for the unit activity concentrations. For ^{238}U, the fraction of 0.0.471 was used, 0.044 for ^{235}U and 0.485 for ^{234}U. The slag exhibits concentrations of ^{226}Ra, and ^{210}Pb; the fraction 0.471 was used for each of these isotopes. This fractional source term was entered directly into the RESRAD code; the short-lived progeny were calculated by RESRAD according to their respective parents.

The input parameters for the physical and chemical characteristics, as described in Section 5.3.1 of this Chapter, were used in the RESRAD code and outlined in Tables 17.3.1, 17.3.2 and 17.4.10, including the unit activity concentrations. The unit activity and input parameters associated with the likely exposure scenario resulted in a dose factor for thorium plus progeny of 1.745 pCi/gram and for uranium plus progeny of 0.597 pCi/gram. The $DCGL_W$ for U+D and Th+D was calculated for a dose criterion of 25 millirem/year or as 12.5 mrem/year for each element (above background), as follows:

$$DCGLUranium = \frac{12.5 mrem/year}{\frac{0.597 mrem/year}{1 pCi/gram}} = 20.9 pCi/gram$$

$$DCGLThorium = \frac{12.5 mrem/year}{\frac{1.745 mrem/year}{1 pCi/gram}} = 7.2 pCi/gram$$

For each uranium isotope, the DCGL was calculated according to the ratio described above. Consequently, the DCGL for ^{238}U is 9.8 and the DCGL for ^{226}Ra and ^{210}Pb is 9.8 pCi/gram.

Background was established during prior site surveys, and summarized in Table 17.2. The DCGLs are based on a maximum dose of 25 mrem/year, the radiation dose is additive and cannot exceed the 25 mrem/year release criteria when combined. Therefore, the unity rule applies and the sum of the

7 ALARA ANALYSIS

The proposed decommissioning action at SMC's Newfield facility is on-site stabilization and long-term control of the residual radioactivity at the site. In order to demonstrate that this approach is consistent with the ALARA (As Low As Reasonably Achievable) principle, a cost-benefit analysis that compares it to other alternatives was performed. As described in Chapter 6 of this Decommissioning Plan, the three alternatives are: (1) Partial restriction of the site under the long-term control license, with the remainder of the site released for unrestricted use; (2) Off-site disposal followed by release of the entire site for unrestricted use (i.e., the license termination alternative) and (3) no action alternative (i.e., the license continuation alternative). The following subsection contains a brief description of the three alternatives along with the results of the cost-benefit analysis.

7.1 Description of Decommissioning Options

7.1.1 On-Site Stabilization and Long Term Control (LTC) Alternative

For the proposed decommissioning action, residual radioactive materials above restricted release levels that are present at the Newfield site will be consolidated into a single capped pile within the Storage Yard, which will remain a radiologically-restricted area. Once the engineered barrier is installed over the seven (7) month construction period, a Final Status Survey of the plant in its entirety will be performed and documented as evidence that the restricted portion of the site meets the established dose criteria for restricted release (i.e., 25 millirem TEDE with all controls in place and 100 millirem if controls fail), and that the unrestricted portion of the site meets the dose criterion for unrestricted release (i.e., 25 millirem TEDE). At that point, License No. SMB-743 would be amended to a long term control (LTC) license, wherein license provisions that include access restrictions, maintenance, monitoring (visual inspections and radiation surveys) and specific legal restrictions against future residential construction, farming or business redevelopment on the restricted area would be attached. The remainder of the property will then be released for unrestricted use.

7.1.2 Off-site Disposal and License Termination (LT) Alternative

The LT alternative would require residual radioactivity present at the Newfield site to be processed and then transported to the Envirocare of Utah, Inc. facility near Clive, Utah for disposal as low-level radioactive waste. Once the two (2) year construction period is complete, a Final Status Survey of the plant in its entirety will be performed and documented as evidence that the site meets the established dose criteria for unrestricted release (i.e., 25 millirem TEDE). At that point, License No. SMB-743 would be terminated and the site released for unrestricted use.

7.1.3 License Continuation (LC) Alternative

If no action is taken at the Newfield site, the residual radioactivity present would retain its current amount and configuration, and the existing conditions of License No. SMB-743 would remain as

they are as of the date of this report.[163] Assuming all provisions of the current license continue to be met, the annual radiation dose potential to workers at the site and to members of the general population would remain unchanged from their current measured values. Although this alternative does not offer an acceptable regulatory basis (i.e., the owner would be in violation of the timeliness requirements of 10 CFR 40.42), it is nonetheless included in the ALARA analysis for comparison purposes only.

7.2 Comparison of Risks

There are a variety of risks associated with each of the aforementioned options. These include physical risks associated with the implementation of the option (i.e., remedial action activities and transportation), as well as radiological risks present during implementation and after the option has been fully implemented. The following subsections describe and quantify these risks in compatible units so that the radiological ramifications of the three options may be fairly compared.

7.2.1 Radiological

Because radiation exposure, if high enough, is associated with an increased risk of cancer, the radiological risk of interest in the comparison of the three decommissioning options applicable to the Newfield site is the risk of incurring fatal cancer. Hypothetically, the risk of harm caused by radiation exposure increases as the exposure increases.[164] However, no effects have ever been observed at levels below 5,000 millirem delivered over a one year period.[165,166] In fact, the effects seen when humans are exposed to 100,000 millirem over a very short time period are temporary and reversible. It takes a short-term dose on the order of 500,000 millirem (without medical intervention) to cause death.[167]

The radiation dose potential to even the maximally-exposed individual associated with the decommissioning of the Newfield site, regardless of which option is selected, is far too low to result in demonstrable health effects. Nonetheless, for the purpose of comparing the three options, the LNT, or "Linear No Threshold" hypothesis provides a useful risk assessment tool. In essence, this hypothesis states that since scientists have observed a linear relationship between radiation dose and effect at high doses and dose rates, and since a "radiation free" environment to test the theory at low doses (taken to be 20,000 millirem TEDE or less) does not exist, for radiation protection purposes it is reasonably conservative to assume that the relationship is indeed linear. While the LNT

[163] As currently written, License No. SMB-743 authorizes possession of up to 303,050 kilograms of thorium in any chemical/physical form, and up to 45,000 kilograms of uranium in any chemical or physical form. As of October 21, 2005, SMC was at 96.8% of the thorium limit and 87.6% of the uranium limit.

[164] This linear relationship between dose and effect is clearly demonstrated in populations that have received large, acute exposures.

[165] Health Physics Society, "Radiation Risk in Perspective", Position Statement of the Health Physics Society, January, 1996 (revised August, 2004).

[166] Health Physics Society, "Compensation for Diseases that Might be Caused by Radiation Must Consider the Dose", Position Statement of the Health Physics Society, March, 2000 (Reaffirmed, March, 2001).

[167] International Commission on Radiological Protection, ICRP Publication 60, "1990 Recommendations of the International Commission", Pergamon Press, 1991.

hypothesis leads to the obvious conclusion that any radiation dose, no matter how small, may be capable of causing some biological damage or detriment - a conclusion that is not supported with facts - it nonetheless offers a conservative risk coefficient that is useful for this assessment.

The coefficient that will be used to derive comparative risks associated with the three decommissioning options is that which gives the individual risk of fatal cancer per rem of dose equivalent, or approximately 5×10^{-4}.[168] The following subsections give the hypothetical risk associated with the option-specific dose for on-site workers and members of the public, and Table 17.9 gives a summary of findings.

7.2.1.1 On-site Workers

LC Alternative

For the LC alternative, radiological conditions at the site would remain as they are today. Since no operations involving source material would be permitted by the continued license, the only pathway for exposure of personnel present on the site would be external exposure associated with close proximity to the slag piles.

The ambient doses incurred by monitored workers during the production of ferrocolumbium, which required them to come in close proximity to both the feed stock and the slag in the operational areas of the plant as well as the Storage Yard, were less than 40 millirem per calendar year.[169] Therefore, the dose potential for current on-site workers, who seldom frequent the Storage Yard and do not perform any other licensed operations, is conservatively assumed to be 50% of the maximum measured exposure for monitored workers, or 20 millirem TEDE. For a 30-year working lifetime, and applying the risk coefficient of 5×10^{-4} a hypothetical fatal cancer risk potential of 3.0×10^{-4} may be assumed for on-site workers.

LTC Alternative

For the LTC alternative, radiological conditions associated with the shaping of the residual radioactivity currently in the Storage Yard and installation of the engineered barrier presents the potential for direct radiation exposure and inhalation of airborne radioactivity by on-site workers.[170] In addition, once the LTC license is in place, the dose potential for on-site workers, would be as shown for the Industrial Worker scenario in Chapter 5 of this decommissioning plan.

From the air modeling results shown in the Environmental Report (see Appendix 19.9), the concentration of airborne particulates for the seven-month duration of these operations is approximately 11×10^{0} micrograms per cubic meter. Assuming a reasonable maximum of 10 times this concentration, and applying the isotopic concentration for each as shown in Table 17.7, the

[168] National Academy of Sciences, National Research Council, Committee on the Biological Effects of Ionizing Radiation, "Health Effects of Exposure to Low Levels of Ionizing Radiation (BEIR-V)", National Academy Press, Washington, D.C., 1990.

[169] See "Report of Radiation Safety Surveillance" for Quarters 1, 2 and 3 of 1996.

[170] Once the residual radioactivity is covered, there will be no measurable dose potential for on-site workers, thus no radiation dose of significance is associated with the performance of the final status survey.

resulting airborne concentration in the Storage Yard for the 512-hour continuous work time associated with placement and configuration would be 2.0×10^{-14} microcuries each of thorium and uranium per milliliter. When the Derived Air Concentrations (DACs) authorized for SMC are applied (i.e., 1.91×10^{-11} microcuries per milliliter for thorium and 8.4×10^{-11} microcuries per milliliter for uranium), the resulting internal dose potential to a hypothetical worker would be 1.7 millirem (CEDE).[171]

The ambient exposure rate measured around the circumference of the Storage Yard ranges from "background" to approximately 130 microR per hour, with an average measured rate of approximately 30 microR per hour.[172] If a hypothetical remediation worker is present somewhere within the Storage Yard for the duration of remedial activities (i.e., 512 working hours), it is not unreasonable to assume his/her dose rate potential from external radiation would be equivalent to the average measured exposure rate, for a total dose potential of 15.4 millirem EDE.

Applying the risk coefficient of 5×10^{-4} to the total dose potential from all exposure pathways of 17.1 millirem TEDE, and assuming a single hypothetical worker incurs the dose from all of these pathways and for all applicable time periods, the fatal cancer risk potential would be 8.6×10^{-6} for on-site workers.

LT Alternative

For the LT alternative, radiological conditions associated with processing (crushing) and packaging the residual radioactivity that is currently in the Storage Yard prior to shipment to the disposal site in Utah presents the potential for direct radiation exposure and inhalation of airborne radioactivity by on-site workers.[173] From the air modeling results shown in the Environmental Report (see Appendix 19.19), an airborne concentration of respirable particulates in air is approximately 22.8×10^{0} micrograms per cubic meter for the five-month duration in operations for each year. Assuming a reasonable maximum of 10 times this concentration, and applying the isotopic concentration for each as shown in Table 17.7, the resulting airborne concentration in the Storage Yard for the 840-hour continuous work time duration would be 4.2×10^{-14} microcuries each of thorium or uranium per milliliter, respectively.[174] When the Derived Air Concentrations (DACs) authorized for SMC are applied for each, the resulting internal dose potential to a hypothetical worker would be 1.0 millirem (CEDE).[175]

[171] Provision 12 of License No. SMB-743 authorizes the use of adjusted ALI and Derived Air Concentration (DAC) values for licensed materials.
[172] Berger, C. D., "Quarter 4, 2004 Perimeter Monitoring Results", submitted to D. R. Smith, January 3, 2005.
[173] Once the residual radioactivity is covered, there will be no measurable dose potential for on-site workers, thus no radiation dose of significance is associated with the performance of the final status survey.
[174] To ensure an element of conservatism in this analysis, no engineered or administrative controls over the work area and the working population and no standard radiation protection principles commonly associated with radiological work of this type were taken into account.
[175] Provision 12 of License No. SMB-743 authorizes the use of adjusted ALI and Derived Air Concentration (DAC) values for licensed materials.

The ambient exposure rate at the circumference of the Storage Yard ranges from "background" to approximately 130 microR per hour, with an average rate of approximately 30 microR per hour.[176] If a hypothetical remediation worker is present somewhere within the Storage Yard for the duration of remedial activities (i.e., 840 hours per year for a total of two years), his/her dose potential from external radiation would be 50.4 millirem EDE.

Applying the risk coefficient of 5×10^{-4} to the total dose potential from the internal and external exposure pathways during construction of 51.4 millirem TEDE results in a fatal cancer risk potential of 2.6×10^{-5} for on-site workers.

7.2.1.2 Members of the Public

LC Alternative

For the LC alternative, radiological conditions at the site would remain as they are today. Since no operations involving source material would be permitted by the continued license, the only pathway for exposure of members of the general public would be external exposure associated with close proximity to the slag piles.

As a licensee, SMC is required by 10 CFR 20.1301 and 1302 to demonstrate that members of the general public do not incur a radiation dose in excess of 100 millirem TEDE in any calendar year. The maximum measured ambient exposure rate at the fence line around the Storage Yard is approximately 130 microR per hour with an average measured rate of approximately 30 microR per hour and a nominal radon dose rate from baghouse dust emanation of approximately 8.2×10^{-3} microR per hour.[177] Monitoring records over the past five years demonstrate that no member of the public has incurred a radiation dose that even approaches the regulatory limit.

Nonetheless, to ensure an element of conservatism in this assessment, it is assumed that a hypothetical member of the general public is present somewhere around the perimeter of the Storage Yard constantly and continuously such that his/her annual radiation dose is equal to the regulatory limit of 100 millirem. Over a 70-year lifetime, that hypothetical member of the public would thus incur a total dose of 7,000 millirem. Applying the risk coefficient of 5×10^{-4} to the lifetime dose potential from both pathways results in a hypothetical fatal cancer risk potential of 3.5×10^{-3} for members of the general public.

LTC Alternative

For the LTC alternative, radiological conditions associated with the shaping of the residual radioactivity currently in the Storage Yard and installation of the engineered barrier presents the potential for direct radiation exposure and inhalation of airborne radioactivity by members of the public.[178]

[176] Berger, C. D., "Quarter 4, 2004 Perimeter Monitoring Results", submitted to D. R. Smith, January 3, 2005.
[177] Berger, C. D., "Quarter 4, 2004 Perimeter Monitoring Results", submitted to D. R. Smith, January 3, 2005.
[178] Once the residual radioactivity is covered, there will be no measurable dose potential for on-site workers, thus no radiation dose of significance is associated with the performance of the final status survey.

From the air modeling results shown in the Environmental Report (see Appendix 19.9), the concentration of airborne respirable particulates during construction operations at the nearest off-site location is 10.97 or approximately 11 micrograms of material per cubic meter. Applying the specific activity for each of the radionuclides in the site source term (see Table 17.7), the resulting uranium or thorium concentration would be 2×10^{-15} microcuries per milliliter. When the Derived Air Concentrations (DACs) authorized for SMC are applied for each, the resulting internal dose potential to a hypothetical worker would be 0.16 millirem (CEDE).

The ambient exposure rate at the circumference of the Storage Yard ranges from "background" to approximately 130 microR per hour, with an average rate of approximately 30 microR per hour.[179] If a hypothetical member of the general public is present somewhere near the perimeter of the Storage Yard constantly and continuously for the duration of remedial activities (i.e., 512 hours), his/her dose potential from external radiation would be 15.4 millirem EDE.

Once the LTC license is issued, the dose potential for members of the public has a maximum value of 25 millirem TEDE. Over a 70-year lifetime, this is equivalent to a dose potential of 1,750 millirem, TEDE. Applying the risk coefficient of 5×10^{-4} to the total dose potential from all exposure pathways of 1,766 millirem TEDE results in a fatal cancer risk potential of 8.8×10^{-4} for members of the public.

LT Alternative

For the LT alternative, radiological conditions associated with the processing and packaging the residual radioactivity currently in the Storage Yard for shipment to the disposal site in Utah presents the potential for direct radiation exposure and inhalation of airborne radioactivity by members of the public.[180] In addition, members of the public may incur direct exposure during the transportation of the residual radioactivity to the Utah disposal site. Furthermore, after the license is terminated, member of the public may incur a radiation dose of up to 25 millirem TEDE in any one year (see Subpart E of 10 CFR 20).

From the air modeling results shown in the Environmental Report (see Appendix 19.9), the concentration of airborne respirable particulates during construction operations at the nearest off-site location is 22.8 micrograms of material per cubic meter. Applying the specific activity for each of the radionuclides in the site source term (see Table 17.7), the resulting uranium or thorium concentration would be 4.2×10^{-15} microcuries per milliliter. When the Derived Air Concentrations (DACs) authorized for SMC are applied for each, the resulting internal dose potential to a hypothetical worker for the two-year construction period (840 hours per year) would be 1.13 millirem (CEDE).

[179] Berger, C. D., "Quarter 4, 2004 Perimeter Monitoring Results", submitted to D. R. Smith, January 3, 2005.
[180] Once the residual radioactivity is covered, there will be no measurable dose potential for on-site workers, thus no radiation dose of significance is associated with the performance of the final status survey.

The ambient exposure rate at the circumference of the Storage Yard ranges from "background" to approximately 130 microR per hour, with an average rate of approximately 30 microR per hour.[181] If a hypothetical member of the general public is present somewhere near the perimeter of the Storage Yard constantly and continuously for the duration of remedial activities (i.e., 1,640 hours), his/her dose potential from external radiation would be 50.4 millirem EDE.

Once the license is terminated, the dose potential for members of the public has a maximum value of 25 millirem TEDE. Over a 70-year lifetime, this is equivalent to a dose potential of 1,750 millirem, TEDE. Applying the risk coefficient of 5×10^{-4} to the total dose potential from all exposure pathways of 1,802 millirem TEDE results in a fatal cancer risk potential of 9.0×10^{-4} for members of the public.

7.2.2 Remedial Action Activities

When any remedial actions are performed, there is a risk for non-radiation-related injury or harm associated with those actions. From NUREG-1496, the workplace accident fatality rate may be assumed to be 4.2×10^{-8} per person-hour.[182] The following subsections give the hypothetical risk of fatality from the remedial actions associated with each option for both on-site workers and members of the public.

LC Alternative

For the LC alternative, it is assumed that there would be no remedial actions performed.[183] Therefore, there would be no potential for harm (fatality) if this option were implemented for either workers or members of the general public.

LTC Alternative

For the LTC alternative, workers incur some risk of fatality from accidents that may occur during the shaping of the residual radioactivity, the installation of the engineered barrier, and during the performance of the final status survey. As shown in Section 8.5 of this decommissioning plan, the time duration of these activities is projected to be a total of 512 working hours, with the number of workers ranging from six (6) to 12. To ensure an element of conservatism in this analysis, a total of 12 workers is assumed, for a collective duration of 6,144 person-hours. Applying the risk coefficient of 4.2×10^{-8} to this collective duration results in a fatality risk potential of 2.6×10^{-4} for on-site workers. The fatality risk potential for members of the general public would be "zero".

LT Alternative

For the LT alternative, workers incur some risk of fatality from accidents that may occur during the processing and packaging of the residual radioactivity for transport to the Utah disposal site. As

[181] Berger, C. D., "Quarter 4, 2004 Perimeter Monitoring Results", submitted to D. R. Smith, January 3, 2005.
[182] NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities", Vol. 2, Appendix B, Table A.1, July, 1997.
[183] This is an unrealistic assumption as it is likely that some sort of future remediation will be necessary. However, for the purposes of this assessment, the no-action option contains no provisions for future remedial actions.

shown in Section 8.5 of this decommissioning plan, the time duration of these activities is projected to be a total of 840 working hours per year for a total of 1,680 hours, with the number of workers ranging from eight (8) to 10. To ensure an element of conservatism in this analysis, a total of 10 workers is assumed, for a collective duration of 16,800 person-hours. Applying the risk coefficient of 4.2×10^{-8} to this collective duration results in a fatality risk potential of 7.1×10^{-4} for on-site workers. The fatality risk potential for members of the general public would be "zero".

7.2.3 Transportation

There are, of course, risks associated with transporting people and goods from place to place. The transport of residual radioactivity from the Newfield site presents no exception. From NUREG-1496, the transportation accident fatality rate may be assumed to be 6.6×10^{-7} per kilometer.[184] The following subsections give the hypothetical risk of fatality from transportation associated with each option for both on-site workers and members of the public.

LC Alternative

For the LC alternative, there would be no remedial actions performed and no materials transported.[185] Therefore, there would be no potential for harm (fatality) if this option were implemented for either workers or members of the general public.

LTC Alternative

For the LTC alternative, people incur some risk of transportation fatality associated with the transport of borrow and construction materials to/from the site as part of engineered barrier installation. For the purposes of cost estimation, a round-trip distance of five (5) miles was assumed. With a total of 1,233 trucks making the trip for the engineered barrier material and 211 trucks making the trip for cover material, the total distance traveled would be 7,220 truck miles or 12,033 kilometers. Applying a fatality risk coefficient of 3.8×10^{-8} (for truck travel) to this total distance results in a transportation fatality risk potential of 4.6×10^{-4} that is applicable to both workers and members of the public.[186]

LT Alternative

For the LT alternative, people incur some risk of fatality from transportation accidents that may occur during the transport of packaged residual radioactivity to the Utah disposal site. As shown in Table 17.15, the projected travel distance for these activities is approximately 2,250 miles. With a total of 737 rail cars making the trip per year over a two-year period, the total distance traveled would be 3,316,500 rail car miles or 5,527,500 kilometers. Applying a fatality risk coefficient of

[184] Federal Railroad Administration, Office of Safety Analysis, "Accident/Incident Overview, January to April, 2005", total accident incident rate with fatalities, July 27, 2005.
[185] This is an unrealistic assumption as it is likely that some sort of future remediation will be necessary. However, for the purposes of this assessment, the no-action option contains no provisions for future remedial actions.
[186] NUREG-1496, "Final Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities", Vol. 2, Appendix B, Table A.1, July, 1997.

2.3 x 10^{-7} (for rail travel) to this total distance results in a transportation fatality risk potential of 7.6 x 10^{-1} that is applicable to both workers and members of the public.[187,188]

7.3 Comparison of Costs

Appendix N of NUREG-1757 (Vol. 2) recommends licensees evaluate the total cost ($Cost_T$) of the various alternatives being evaluated, which is then balanced against the benefits. The following is the calculational methodology provided:[189]

$$Cost_T = Cost_R + Cost_{WD} + Cost_{ACC} + Cost_{TF} + Cost_{WDose} + Cost_{PDose} + Cost_{other}$$

where $Cost_R$ = the monetary cost of the decommissioning alternative, $Cost_{WD}$ = the monetary cost for transport and disposal of the waste generated by the action, $Cost_{ACC}$ = the monetary cost of worker accidents during the action, $Cost_{TF}$ = the monetary cost of traffic fatalities during waste transportation, $Cost_{WDose}$ = the monetary cost of dose received by workers performing the alternative and transporting waste to the disposal facility, $Cost_{PDose}$ = the monetary cost of the dose to the public from excavation, transport and disposal of waste, and $Cost_{other}$ = other costs as appropriate for the particular situation (i.e., licensing, changes in land value, environmental impacts).

Chapter 15 and Table 17.14 give the cost estimates for the preferred decommissioning option (i.e., the LTC alternative). This and the estimates for the LC and the LT alternatives (see Tables 17.15 and 17.16) were based on a variety of cost-estimating data sources, vendor information, conventional cost-estimating guides, inflation adjustment, and similar estimates as modified by prior site-specific project cost information. The following subsections summarize the costs associated with the other parameters in the aforementioned equation for each of the decommissioning options.

7.3.1 Remedial Action Activities

LC Alternative

For the no-action option, $Cost_R$ would be the on-going annual costs, or those associated with license compliance only. These would include the cost of radiological surveillance, record keeping, licensing fees, and regulatory interactions. Based on costs incurred in calendar year 2004, the total annual cost of these activities at the Newfield site is $62,400. The present worth of this cost incurred annually over a 1,000-year period, assuming a 3% rate of return in accordance with recent USNRC guidance, would be $2,700,000. Table 17.16 shows the breakdown for this cost estimate.

LTC Alternative

The $Cost_R$ of implementing the LTC alternative is described in detail in Chapter 15 of this decommissioning plan. That cost, which includes the cost of long-term surveillance and

[187] Federal Railroad Administration, Office of Safety Analysis, Accident/Incident Overview, January to December, 2004 (see http://safetydata.fra.dot.gov/OfficeofSafety/Query/Default.asp?page=statsSas.asp for data base).
[188] The risk associated with transporting soil cover material for the remediated storage yard was not included in the assessment.
[189] NUREG-1757, Vol. 2, Appendix N, Section N.1.2.

maintenance, as well as the cost of record keeping, licensing fees, and regulatory interactions over a 1,000-year period is $ 5,172,507, adjusted for the escalating cost of money. Table 17.14 shows the breakdown for this cost estimate.

LT Alternative

For the LT alternative, $Cost_R$ is equal to the cost of material packaging, shipment, disposal, and the associated cost to complete the final status survey and then terminate License No. SMB-743. The cost of transporting the packaged material to the disposal site is shown in Table 17.15. Once the license is terminated and all applicable records transferred to the USNRC pursuant to Subpart L of 10 CFR 10, there would be no continuing cost. Therefore, the total cost of the alternative would be $58,080,851. Table 17.15 shows the breakdown for this cost estimate.

7.3.2 Transportation of Waste

LC Alternative

For the no-action option, no waste would be shipped for disposal. Therefore, there would be no waste transportation cost associated with this alternative.

LTC Alternative

For the LTC alternative, no waste would be shipped for disposal. Therefore, there would be no waste transportation cost associated with this alternative.

LT Alternative

Before terminating License No. SMB-743, all packaged and staged radioactivity must be transported approximately 2,250 miles to the Envirocare of Utah facility. The cost of this action is $14,485,122.

7.3.3 Waste Disposal

LC Alternative

For the no-action option, no waste would be disposed of.[190] Therefore, there would be no waste disposal cost associated with this alternative.

LTC Alternative

For the LTC option, no waste would be disposed of. Therefore, there would be no waste disposal cost associated with this alternative.

LT Alternative

The cost of disposing of all packaged and shipped residual radioactivity from the Newfield site includes the cost of acceptance testing. As shown in Table 17.15, this amount has been estimated at $21,539,215.

[190] This is an unrealistic assumption as it is likely that some sort of future remediation with associated waste disposal will be necessary. However, for the purposes of this assessment, the no-action option contains no provisions for disposal of waste.

7.3.4 Cost of Construction (Non-Radiological) Risks

LC Alternative

For the no-action option, no construction would be on-going.[191] Therefore, there are no construction risk costs associated with this alternative and $Cost_{ACC}$ is zero.

LTC Alternative

For the LTC option, there is a risk of construction-related injuries. As recommended in NUREG–1496, their cost may be evaluated as follows:

$$Cost_{ACC} = \$3{,}000{,}000 \times F_W \times T_A$$

where \$3,000,000 = the USNRC's recommendation on the monetary value of a fatality equivalent to \$2,000 per person rem; F_W = the workplace fatality rate in fatalities per hour worked; and T_A = the worker time required for remediation in units of worker-hours.[192]

For the LTC alternative, the workplace fatality risk, as shown in Section 7.2.2, above, is 2.6×10^{-4}. Therefore, the cost of construction risks for this alternative is:[193]

$$Cost_{ACC} = \$3{,}000{,}000 \times 2.6{\times}10^{-4} = \$780$$

LT Alternative

There is also a risk of construction-related injuries for the LT option. Using the same approach shown previously, with a workplace fatality risk of 7.1×10^{-4}, the cost of construction-related risks for this alternative is:[194]

$$Cost_{ACC} = \$3{,}000{,}000 \times 7.1{\times}10^{-4} = \$2{,}130$$

[191] This is an unrealistic assumption as it is likely that some sort of future construction activities will be necessary. However, for the purposes of this assessment, the no-action option contains no provisions for on-site construction.

[192] If the cost per person-rem averted is increased to \$20,000 as suggested in NUREG-1757, Vol. 2, Appendix N (Section N.4), the cost associated with a transportation fatality would increase to \$30,000,000 and the cost associated with workplace accidents would thus be determined as follows:

$$Cost_{ACC} = \$30{,}000{,}000 \times F_W \times T_A$$

[193] If the basis for the cost per fatality is made consistent with the recommendations of NUREG-1757, Vol. 2, Appendix N (Section N.4), the $Cost_{Acc}$ in this case would be \$7,800.

[194] If the basis for the cost per fatality is made consistent with the recommendations of NUREG-1757, Vol. 2, Appendix N (Section N.4), the $Cost_{Acc}$ in this case would be \$21,300.

7.3.5 Cost of Transportation Risks

LC Alternative

For the no-action option, no transportation of residual radioactivity would occur.[195] Therefore, there are no transportation risk costs associated with this alternative.

LTC Alternative

For the LTC option, no transportation of residual radioactivity off-site would occur. However, there is transportation associated with the construction of the engineered barrier. As recommended in NUREG–1496, the cost of transportation-related risks may be evaluated as follows:

$$Cost_{TF} = \$3{,}000{,}000 \times \frac{V_A}{V_{SHIP}} \times F_T \times D_T$$

where \$3,000,000 = the monetary value of a fatality equivalent to \$2,000 per person rem; V_A = the volume of material in units of cubic meters, F_T = the fatality rate per vehicle-kilometer traveled in units of fatalities per vehicle-km; D_T = the distance traveled in km; and V_{SHIP} = the volume of a vehicle shipment in cubic meters.[196,197] From Section 7.2.3, above, the transportation-related risk for the LTC alternative is 4.6×10^{-4}. Therefore, the cost of transportation risks for this alternative would be:[198]

$$Cost_{TF} = \$3{,}000{,}000 \times 4.6 \times 10^{-4} = \$1{,}380$$

[195] This is an unrealistic assumption as it is likely that some sort of future remediation that involves transportation of materials will be necessary. However, for the purposes of this assessment, the no-action option contains no provisions for transport.

[196] The NUREG-1496 equation requires input parameters in units associated with transport by truck. However, it is anticipated that the residual radioactivity at the Newfield site would be transported by rail rather than truck, thus the reason for different units.

[197] If the cost per person-rem averted is increased to \$20,000 as suggested in NUREG-1757, Vol. 2, Appendix N (Section N.4), the cost associated with a transportation fatality would increase to \$30,000,000 and the cost associated with workplace accidents would thus be determined as follows:

$$Cost_{TF} = \$30{,}000{,}000 \times \frac{V_A}{V_{SHIP}} \times F_T \times D_T$$

[198] If the basis for the cost per fatality is made consistent with the recommendations of NUREG-1757, Vol. 2, Appendix N (Section N.4), the $Cost_{TF}$ in this case would be \$13,800.

LT Alternative

For the LT option, there is a risk of transportation-related injuries in the shipment of residual radioactivity to the Envirocare of Utah site. Using the same approach shown previously, with a transportation fatality risk of 7.6×10^{-1}, the cost of construction-related risks for this alternative is:[199]

$$Cost_{TF} = \$3{,}000{,}000 \times 7.6 \times 10^{-1} = \$2{,}280{,}000$$

7.3.6 Cost of Radiological Risks (With Long-term Surveillance and Maintenance)

LC Alternative

NUREG-1496 recommends the use of a collective dose cost value of $2,000 per person rem. As shown in Section 7.2.1.1, the radiation dose associated with the LC alternative for industrial workers at the SMC site in its current condition is 600 millirem TEDE (20 millirem TEDE for 30 years. Pursuant to NUREG-1496 recommendations, a population density of 0.0004 persons per square meter of land may be assumed, meaning the anticipated population at the 67-acre Newfield property would be approximately 109 people, and the resulting collective dose would be approximately 65 person-rem. This would then result in a cost for the hypothetical radiological risks incurred of $130,800. If a 3% discount rate is applied, a cost of $4,360,000 results.[200]

As shown in Section 7.2.1.2, the total long-term permissible dose for a hypothetical member of the general public would be 7,000 millirem (100 millirem TEDE for 70 years). Again assuming the population is equivalent to that for the Newfield site, 109 people each year, the collective dose would thus be 763 person-rem. This would then result in a cost for the hypothetical radiological risks incurred ($Cost_{Wdose} + Cost_{PDose}$) of $50,866,667, discounted at the rate of 3%.

LTC Alternative

As shown in Section 7.2.1.1, the dose associated with the LTC alternative during construction activities is 17.1 millirem. For a nominal nine-person worker population, the collective dose would be during construction is 154 millirem or 0.2 rem, with an associated cost value of $400.

As shown in Section 7.2.1.2, the total dose associated with the post-construction phase is 1,766 millirem (25 millirem TEDE for 70 years). Again assuming the population of the Newfield site is 109 people each year, the collective dose would thus be 193 person-rem. This would then result in a cost ($Cost_{Wdose} + Cost_{PDose}$) for the hypothetical radiological risks incurred of $12,853,733 when a 3% discount rate is applied to the long-term component.

LT Alternative

As shown in Section 7.2.1.1, the dose associated with the LT alternative during construction activities is 51.4 millirem. For a nominal nine-person worker population, the collective dose during construction is 0.5 rem, with an associated cost value of $1,000.

[199] If the basis for the cost per fatality is made consistent with the recommendations of NUREG-1757, Vol. 2, Appendix N (Section N.4), the $Cost_{TF}$ in this case would be $22,800,000.
[200] NUREG-1757, Vol. 2, Appendix N, (Section N.1.1).

As shown in Section 7.2.1.2, the total dose associated with the post-construction phase is 1,802 millirem (25 millirem TEDE for 70 years). Again assuming the population of the Newfield site is 109 people each year, the collective dose would thus be 344 person-rem. This would then result in a cost ($Cost_{Wdose}$ + $Cost_{PDose}$) for the hypothetical radiological risks incurred of $22,901,000 when a 3% discount rate is applied to the long-term component.

7.3.7 Licensing

There are a variety of licensing and other regulatory costs associated with each of the decommissioning alternatives for the site. Since each of these can significantly impact the total project cost and are difficult to predict, the evaluation below is qualitative in nature only.

For the LC alternative, licensing costs include the cost of maintaining the license, financial assurance and the cost of periodic inspections and re-licensing efforts. For the LTC alternative, the costs include licensing fees to develop an Environmental Impact Statement, financial assurance associated with the monitoring and maintenance trust, deed noticing costs, public and Site Specific Advisory Board (SSAB) meeting charges as required in 10 CFR 20.1403(d)(2) and heretofore unknown future liabilities. Because no regulatory interactions would be necessary with the LT alternative, there would be no licensing costs. On a qualitative basis, it is clear that the LT alternative would present the greatest cost avoidance, followed somewhat closely by the LC alternative.

7.3.8 Change in Land Value

During the actual implementation of the alternatives listed below, no impacts on the economic use of the property are expected to result, as the actions associated with each alternative are basically limited to the Storage Yard and adjacent areas that are not currently industrially active. Therefore, this evaluation focuses on potential impacts on land value once the alternatives have been implemented.

Long-term potential changes in land value associated with the implementation of these alternatives are difficult to estimate, as they not only involve the normal variables associated with real estate cycles, but also such intangible factors as the potential stigma associated with a real or perceived environmental hazard, perceived risks, changes in science which may impact existing risk analyses, and potential future liability associated with regulatory changes. More practical but still intangible factors a potential developer faces also include problems associated with achieving financing for such a property or the general "trouble factor" of dealing with such a property. Since each of these variables can significantly impact future land values and are extremely difficult to predict, the evaluation presented below focuses on a qualitative evaluation of potential impacts on land value associated with each of the alternatives.

<u>LC Alternative</u>

For the no-action option, no changes in the existing nature of the site would occur. Therefore, there are no costs or benefits in terms of future land value associated with this alternative.

LTC Alternative

For the LTC option, engineering, institutional and regulatory controls would limit future use of the remaining restricted area (i.e., the area beneath the engineered barrier). Other existing restrictions associated with natural resource restoration requirements will prevent future use/redevelopment of much of the currently undeveloped area of the SMC facility. It is expected that industrial operations will continue in the existing developed portions of the facility. Based on the industrial worker assessment presented in Chapter 5, no restrictions on future continued use of the existing industrial areas are anticipated. Therefore, no adverse impacts to existing land value are anticipated for these areas. With the aesthetic improvements associated with the engineered barrier materials as well as the improved aesthetics associated with the natural resource restoration program (i.e., reforestation of undeveloped portions of the site), an increase in future land use value could result.

LT Alternative

For the LT option, upon, the site would be released for unrestricted use completion of the removal of residual radioactivity. Existing restrictions associated with natural resource restoration requirements will prevent future use/redevelopment of much of the currently undeveloped area of the SMC facility. Similarly, soil contaminant levels will likely prevent any future residential use of the site. However, continued industrial use of the existing developed areas is likely. Because the implementation of the LT alternative requires the upgrading of an existing railroad spur along the northern border of the site to support the removal of materials off-site, the value of the facility as an industrial property is likely to increase following remediation. As the railroad spur borders the northern edge of the SMC facility, associated rail spur improvements also have the potential to increase the value of other adjacent properties for future industrial use (e.g., the former Newfield municipal landfill, located immediately to the north of the Storage Yard area).

7.3.9 Environmental Impacts

LC Alternative

For the no action option, the existing Storage Yard area remains a potential erosion source and, therefore, a potential source of impacts to surface water quality should storm water management controls not be maintained in the future. The Storage Yard area provides poor ecological habitat value and the exposed materials act as a potential a source of wind erosion.

LTC Alternative

For the LTC option, reshaping of existing Storage Yard materials (which will require handling of only a portion of the existing materials) and the placement of cover materials over the pile will result in emissions that will be only a fraction of the Derived Air Concentrations (DACs). Costs associated with the control of these emissions are included in the remedial action costs discussed in Section 7.3.1. No other environmental costs are expected to be associated with the implementation of the LTC alternative.

Long-term environmental benefits associated with the implementation of the LTC alternative include the reduction in potential erosion (both wind- and water-induced) of currently uncovered Storage

Yard materials and the improved ecological habitat value of the engineered barrier relative to existing conditions.

LT Alternative

For the LT option, the removal of residual radioactivity will result in greater emissions than those associated with the LTC alternative, as all of the residual radioactive materials will have to be removed and some will have to be crushed on site prior to loading in railcars for off-site disposal. The emissions associated with this alternative are estimated to be only a fraction of the applicable DACs. Costs associated with the control of these emissions are included in the remedial action costs discussed in Section 7.3.1.

An environmental cost associated with the implementation of the LT option that is difficult to quantify is the cost of the loss of existing habitat associated with the upgrading of the existing railroad spur along the facility's northern property line. Since the spur was last used, the associated area has grown over with dense vegetation. It is estimated that nearly 2 acres of dense vegetation will require removal to support the rehabilitation and extension of the existing spur.

An indirect environmental cost associated with the implementation of the LT option that is difficult to quantify is the cost associated with the consumption of landfill space at the disposal facility. The permitting, design and construction of such facilities are extremely costly. While the costs of the development and maintenance of the Envirocare facility are reflected in their existing disposal costs, it is reasonable to expect that the development of new facilities in the future will be even costlier. By consuming currently permitted landfill airspace, a valuable commodity is being expended, guaranteeing increased costs for future projects where on-site stabilization is not an option.

Long-term environmental benefits associated with the implementation of the LT alternative include the permanent removal of residual radioactivity from acting as a source of future erosion (both wind- and water-induced) at this site. However, as the materials will not be destroyed but instead contained within another facility in Utah, the ultimate potential for future impacts due to wind- and water-induced erosion will be limited by the containment features of the disposal facility.

While removal of the radioactive materials will allow for the area in which they are currently stored to be planted with more habitat-friendly plants, the unrestricted use of the area will allow for its future development. Therefore, the long-term enhanced ecological value of the area is not guaranteed.

7.3.10 Cost Summary

Tables 17.14, 17.15 and 17.16 contain a summary of the costs associated with each of the three decommissioning alternatives applicable to the Newfield site. For the LC alternative, the $Cost_T$ is $53,077,467. For the LTC alternative, the $Cost_T$ is $18,028,800, and for the LT alternative, the $Cost_T$ is $83,264,981.

7.4 Cost/Benefit Analysis

Table 17.9 shows the potential hazard, the risk estimate determined for that hazard, and the implementation cost for each of the decommissioning options evaluated in this Chapter. It also demonstrates that the LTC alternative presents a lower risk of fatality compared to the LT alternative and a lower total project cost.

With respect to radiological impacts only, a simple cost-benefit analysis can be performed by evaluating the following:

$$X + \alpha S = Minimum$$

where X = the cost of achieving a given level of protection ($), S = the collective dose (person-rem), and α = a constant expressing the cost assigned to the collective dose.[201] The following is a summary of the radiological cost-benefit analysis for the three options:

Cost-Benefit Analysis Summary

Option	X ($)	S (Person-Rem)	α ($ per Person-Rem Averted)	Result ($)
LC Alternative	$2,700,000	828	$20,000	$19,260,000
LTC Alternative	$5,172,507	193	$20,000	$9,036,507
LT Alternative	$58,080,851	344	$20,000	$64,964,851

Consistent with the ALARA concept, the LTC alternative again gives the lowest result and thus presents the most cost-effective solution.

7.5 Summary

Most decisions about human activities are based on an implicit form of balancing the costs and benefits leading to the conclusion that the conduct of a chosen practice is "worthwhile".[202] With

[201] A value of $2,000 is the value in dollars of a person-rem averted in NUREG/BR-0058, "Regulatory Analysis Guidelines of the U. S. Nuclear Regulatory Commission", Revision 2, November, 1995. However, NUREG-1757, Vol. 2, Appendix N (Section N.4), reads as follows: "Subpart E, 10 CFR 20.1403(e)(2) addresses circumstances in which a licensee would be required to demonstrate that further reductions in residual radioactivity would be prohibitively expensive. This can be demonstrated by an analysis like the ALARA analysis described above, but using a value of $20,000 per person-rem when calculating the value of the averted dose. This value reflects NRC's statement in the final rule on radiological criteria for license termination that NRC considers it is appropriate that a remediation would be prohibitively expensive if the cost to avert dose were an order of magnitude more expensive than the cost recommended by NRC for an ALARA analysis (see page 39071 of "Radiological Criteria for License Termination," Final Rule, *Federal Register*, Volume 62, 62 FR 39058, July 21, 1997)." In light of this guidance a value of $20,000 of person-rem averted is used in the analysis.

[202] International Commission on Radiological Protection, ICRP Publication 55, "Optimization and Decision-Making in Radiological Protection", Pergamon Press, 1989.

respect to the use and control of radioactive materials, the decision-making process is typically based upon the following:

- No practice shall be adopted unless its introduction produces a positive net benefit;
- All exposures to ionizing radiation shall be kept as low as reasonably achievable, economic and societal factors being taken into account; and
- The dose equivalent to individuals shall not exceed applicable regulatory dose limits.

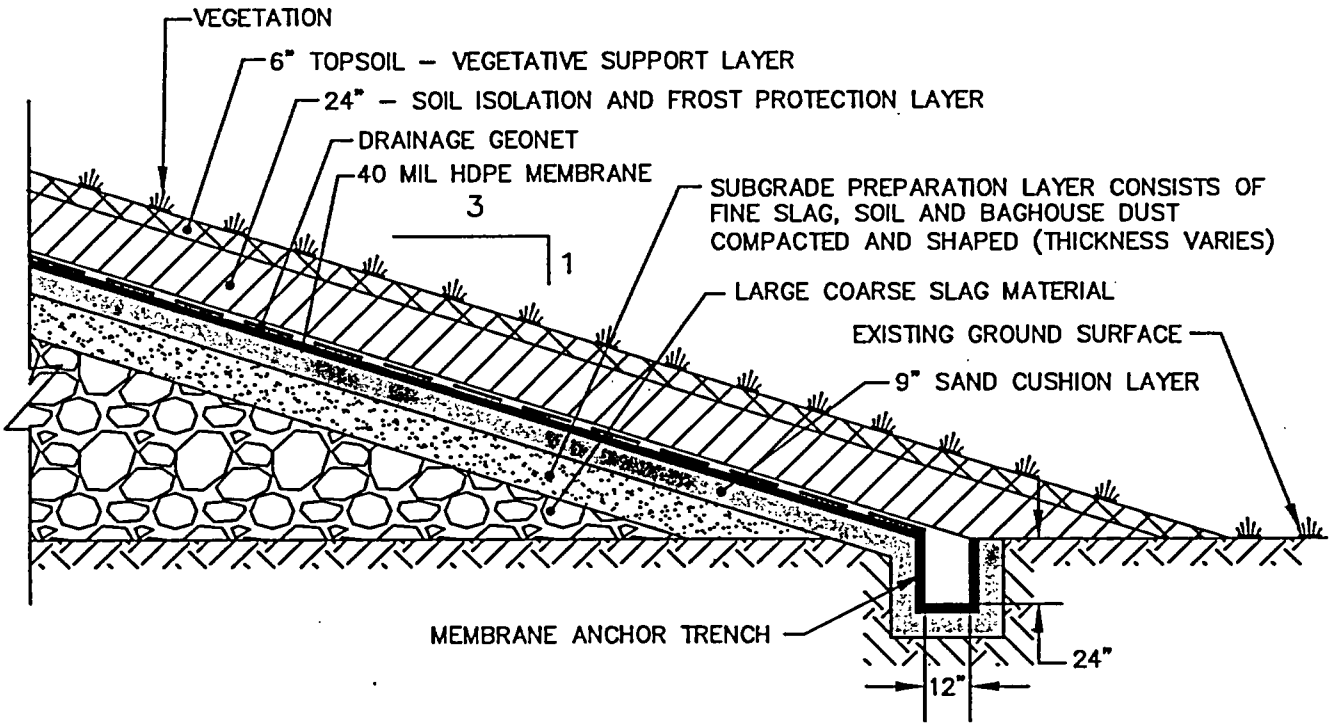
As part of the decommissioning planning process for SMC's facility in Newfield, three alternatives were compared in light of ALARA considerations. These were the LC (license continuation) alternative, the LTC (long-term control) alternative, and the LT (license termination) alternative. In the analysis, project costs, construction-related fatalities, transportation-related fatalities, and the risks of radiation exposure were compared for all options.

The results demonstrate that the LTC alternative is the most defensible decommissioning option for this site based upon ALARA considerations.

Table 17.1 - Residual Radioactivity Volumes at the Newfield Site

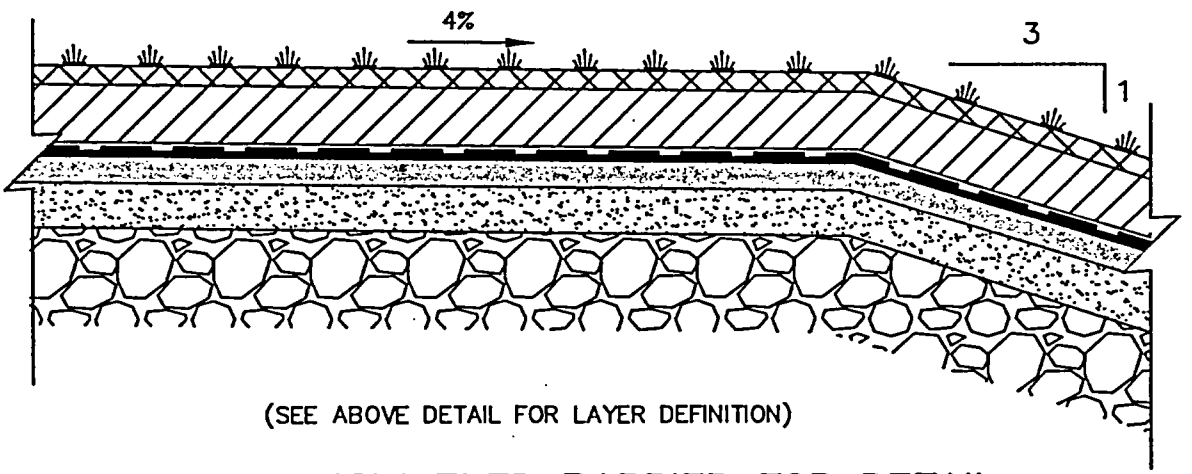
Area	Parcel	Volume (cubic feet)	Volume (cubic meters)
1	Excavated soil mixed with slag	405000	11000
2	Excavated soil from D111 demolition	27000	800
3	Canal (crushed slag that is both in and out of Supersacs)	81000	2300
4	Slag	810000	23000
5	Slag & demolition concrete	135000	3800
6	Columbium Hi-Ratio Slag	54000	1500
7	Hi Ratio Slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning Materials	27000	800
8	Baghouse Dust	351000	10000
9	Baghouse dust mixed with slag	108000	3100
T12	D111/D112 demolition concrete	13500	400
E of N-S road; W of Storage Yard	D111/D112 demolition concrete	40500	1100
SW fenceline; T12 tank area	Possible slag used as fill (not confirmed to be licenseable; volume maximized)	216000	8000
	Total	*2268000*	*65,800*

Figure 18.8 - Engineered Barrier Construction Detail



TYPICAL ENGINEERED BARRIER SIDE SLOPE DETAIL

N.T.S.



(SEE ABOVE DETAIL FOR LAYER DEFINITION)

TYPICAL ENGINEERED BARRIER TOP DETAIL

N.T.S.

TRC
Customer-Focused Solutions

5 Waterside Crossing
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL
NEWFIELD, NEW JERSEY

FIGURE 18.8
ENGINEERED BARRIER
CONSTRUCTION DETAILS

Date: 10/05 | Project No. 26770-0000-00000

J:\Cad\26770\0000\00000\
FIG-18.8.dwg Layout:Model October 20, 2005-2:59PM KHOLLENBECK

SHIELDALLOY METALLURGICAL CORPORATION

12 WEST BOULEVARD
P.O. BOX 768
NEWFIELD, NJ 08344-0768
TELEPHONE (856) 692-4200

June 30, 2006

Kenneth L. Kalman
Decommissioning Branch
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Follow-up to the March 9, 2006 Meeting and Response to USNRC Letter of January 26, 2006

Dear Mr. Kalman:

Consistent with 10 C.F.R. § 40.42(g)(2), the U. S. Nuclear Regulatory Commission (USNRC) authorized Shieldalloy Metallurgical Corporation (SMC) to submit a revised "Decommissioning Plan for the Newfield Facility" (Report No. 94005/G-28247, Rev. 1), hereinafter referred to as the "DP" by June 30, 2006. By the submission of this letter, the current version of the DP, hereinafter referred to as Rev. 1a, supersedes all previous versions.[1]

On March 9, 2006, representatives of SMC met with USNRC to discuss a path forward after receiving the USNRC's letter of January 26, 2006. In that letter, the USNRC refused to docket and submit for technical review the, even though SMC firmly believes that the document, as submitted, met *all* of the USNRC's criteria for acceptability.[2,3],[4]

The purpose of this letter is to respond to the issues raised in the USNRC's January 26th letter (see Attachment 1), during the March 9th meeting, and during an April 11, 2006 technical meeting at the Newfield site. Specifically, this letter transmits modifications to Rev. 1 of the DP to document discussions on dose modeling, hydrology and erosion protection; to resolve financial assurance concerns; and to confirm eligibility for the proposed institutional control methodology.

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[1] The entirety of this letter, plus Rev. 1a of the DP, will be published shortly on SMC's web site (http://www.shieldalloy.com/decommissioning/index.html) for public review.

[2] U. S. Nuclear Regulatory Commission, NUREG-1757, Volume 1, Rev. 1, "Consolidated NMSS Decommissioning Guidance; Decommissioning Process for Materials Licensees", Chapter 16, Appendix D, September, 2003.

[3] Supplemental guidance in the form of "draft for comment" revisions to NUREG-1757, released by the USNRC shortly before the October 24, 2005 submission date of this Plan (70 FR 56940-56941, "Draft Report for Comment: Office of Nuclear Material Safety and Safeguards Consolidated Decommissioning Guidance: Updates to Implement the License Termination Rule", September 29, 2005), was captured in the checklists.

[4] Bellamy, R. R., U. S. Nuclear Regulatory Commission, letter to D. R. Smith, Shieldalloy Metallurgical Corporation, "Rejection of Decommissioning Plan for the Newfield Facility and Denial of the Exemption Request to Postpone Initiation of Decommissioning Process, Control No. 132074", February 28, 2003.

SMC understands that the process of approving a decommissioning plan under restricted release conditions that includes a Long Term Control (LTC) license is unique to both SMC and the USNRC. We also understand that the approval process may not be as straight-forward as would be the case for conventional decommissioning (i.e., unrestricted release). In its January 26, 2006, letter, the USNRC stated that it was not accepting the DP at that time because acceptance then "would likely require multiple rounds of requests for additional information (RAIs) from the NRC staff." Because there is no published requirements restricting the number of RAIs, and because Rev. 1 of the DP met all of the USNRC's published requirements for acceptability, we hope that the decision to docket Rev. 1a will not be adversely influenced by unpublished administrative guidance.

Once Rev. 1a of the DP has been docketed, we look forward to continuing our productive dialogue with the USNRC on the most efficient and cost-effective means of achieving the regulatory objectives for decommissioning the site, including public participation in accordance with 10 C.F.R. § 20.1405 and 10 C.F.R. Part 51. In accordance with 10 C.F.R. § 40.42(d), SMC is ready to begin decommissioning upon USNRC approval of the DP. In the meantime, I can be reached at (856) 692-4205, ext. 226 if you have any questions.

Sincerely,

David R. Smith,
Radiation Safety Officer

cc: Eric Jackson
Joseph Diegel
David White
Robert Haemer, Esq. - Pillsbury Winthrop Shaw Pittman
Charles L. Harp, Esq. - Archer & Greiner
Carol D. Berger, CHP - Integrated Environmental Management, Inc.
Jean Oliva, PE - TRC
Michael Turner - MMW Group
Marjorie M. McLaughlin - USNRC Region I

cc w/o enc: Commissioner Lisa Jackson - NJDEP
Donna Gaffigan - NJDEP
Mayor Richard Westergaard
Assm. David Mayer
Assm. Paul Moriarity
Assm Fred Madden
Congressman Frank LoBiondo
Congressman Robert Andrews

ATTACHMENT 1
SMC Response to the USNRC's letter of January 26, 2006

USNRC Issue No. 1: During numerous meetings with SMC, the NRC staff stressed the importance of identifying and justifying the chosen value for parameters determined to be important to the estimated dose. For most of the scenarios evaluated for the restricted area, assuming that institutional controls fail, key parameters are not identified. For example, in Chapter 17, SMC discussed how parameter values were derived, but no justification was provided. In fact, some significantly important parameters (e.g., shielding factor) are not even included in the list.

SMC Response: SMC maintains that all of the key parameters used as input to the dose modeling were identified and justified in Rev. 1 of the DP. SMC described and presented the justification for each of the RESRAD input parameters of significance in Chapters 5 and 17 of the DP. The USNRC agreed during previous meetings and teleconferences with SMC that it would *not* be necessary to provide justification for generic or widely-accepted parameters (i.e., breathing rates) and those that would have marginal impact on the resulting dose. Because many of the parameters are common to all scenarios, a collective discussion of these appeared in Section 5.2, thus they were omitted from the scenario-specific discussions in Section 5.3.

In regard to the shielding factor issue, the following quote from the RESRAD Manual is pertinent: "*The occupancy factor (OF) and shielding factor account for the fraction of a year that an individual is located on the site and the reduction in external exposure rate afforded by onsite buildings or other structures while the individual is indoors.*" (Yu, C. Et al, ANL/EAD-4). Because none of the exposure scenarios applicable to the Newfield site involve the placement of any sort of building on top of the engineered barrier in the Storage Yard, the application of a shielding factor is not only unnecessary, it would degrade the element of conservatism built into SMC's assessments.

It is important to note that the USNRC was provided with preliminary drafts of Chapters 5 and 17 in advance of submission of Rev. 1 of the DP. At no time during the information exchanges was SMC told that the contents would not pass the acceptability review.

In follow-up information exchanges with the USNRC, SMC asked the Staff to provide one or two examples of dose modeling for decommissioning that they would deem acceptable for technical review.[5] SMC was referred to the DPs for the Michigan Department of Natural Resources (MDNR) and Whittaker sites, accessible on the ADAMS data base.[6] SMC researched ADAMS and identified only two documents that appeared relevant:[7]

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[5] Berger, C. D., Integrated Environmental Management, Inc., e-mail communication to Mark Thaggard, U. S. Nuclear Regulatory Commission, March 29, 2006, 8:51 a.m.

[6] Kalman, Kenneth, U. S. Nuclear Regulatory Commission, e-mail communication to David Smith, Shieldalloy Metallurgical Corporation, April 5, 2006, 2:57 p.m.

[7] The USNRC did not give SMC the ADAMS accession numbers or specific references to the MDNR or Whittaker documents that they would consider to be model documents.

- Michigan Department of Natural Resources, "Decommissioning Plan; Tobico Marsh SGA Site, Kawkawlin, Michigan", February, 2003.

- Whittaker Corporation, "Dose Assessment in Support of Establishing Derived Concentration Guideline Levels for the Whittaker Decommissioning Site", August, 2004.

The approach these licensees used to justify dose modeling input parameters, in both cases, is significantly less comprehensive than the approach put forth by SMC in Rev. 1 of the DP. Consequently, SMC remains unclear with respect to the USNRC's additional requirements regarding parameter justification necessary for the DP forward for technical review.

Action to be Taken: SMC has modified the individual exposure scenarios described in Sections 5.3.1 and 5.3.2 of the DP to add the following specific sub-sections: Description of the Critical Group; Pathways included in the Trespasser Scenario; and Justification for the Key Parameters Used in the Analysis. The basis for selecting the referenced values in those subsections, if more than one value in a reference is applicable, has been clearly stated.

Appendix A of this attachment contains Chapter 5 of the DP, which has been revised. The Chapter 5 that currently exists in all USNRC copies of Rev. 1 of the DP should be removed and replaced with the pages in the Appendix in order to upgrade them to Rev. 1a..

The Chapter 17 tables that list the various RESRAD input parameters have also been modified to show the justification and/or source for each selection (e.g., RESRAD default, site-specific information, referenced information, etc.). Appendix B of this attachment contains the revised tables, which should replace those that currently exist in all USNRC copies of Rev. 1 of the DP in order to upgrade the DP to Rev. 1a.

Appendix 19.5 of Rev. 1 of the DP contains the summary reports from the dose modeling. As a result of parameter modifications agreed to herein, new summary reports are necessary. In order to keep from generating and transmitting the large volumes of paper associated with those reports SMC would be pleased to transmit them to the staff under separate cover and electronically. Once agreement between SMC and the USNRC on the applicable input parameters is reached, Appendix 19.5 replacement pages for all USNRC copies of Rev. 1 of the DP will be provided in order to upgrade them to Rev. 1a.

USNRC Issue No. 2: It should be noted that the greatest expected risk associated with the site is expected to be associated with the radioactivity in the controlled area once controls have failed. However, more discussion is provided for chosen parameter values for situations at the site where the radiological risk is expected to be much less (e.g., scenarios associated unrestricted release). In some of these situations, the justification for chosen parameter values is minimal. For example, for the industrial scenario, SMC noted that the fraction of time spent outdoors and the shielding factor are two of the most sensitive parameters. However, the reference cited as a basis for the chosen value for the fraction of time spent outdoors would suggest that the selected value is likely to result in a lower than actual dose.

SMC Response: See response to USNRC Issue No. 1.

Action to be Taken: See actions taken in response to USNRC Issue No. 1.

USNRC Issue No. 3: The value selected for the shielding factor is not even listed. In other cases, a reference is cited. However, it is not clear how the chosen value was derived from the reference (e.g., the fraction of the time that a trespasser is assumed to spend at the site in the unrestricted release area) or the basis for selecting the value (e.g., why it is considered to be either acceptable or conservative).

SMC Response: See response to USNRC Issue No. 1.

Action to be Taken: See actions taken in response to USNRC Issue No. 1.

USNRC Issue No. 4: In considering multiple land-use scenarios, SMC needs to provide more information used in defining the scenarios and developing appropriate exposure pathways. For example, the justification for excluding the groundwater as an exposure pathway is lacking in that it amounts to assuming that the current water supply will always be available.

SMC Response: See response to USNRC Issue No. 1. SMC maintains that there is sufficient justification for excluding the groundwater exposure pathway from the various dose assessments performed in Chapter 5 of the DP, not the least of which is that the groundwater at the site is not potable.[8]

Action to be Taken: See actions taken in response to USNRC Issue No. 1. The exposure scenarios outlined in Sections 5.3.1 and 5.3.2 of the DP will be modified to include expanded justifications for excluding the drinking water pathway from the analysis. Also, as suggested in Appendix M (section M.5.2.1) of NUREG-1757, Vol. 2, an independent consultant report that compares the quality of the groundwater in the vicinity of the site to the Primary and Secondary Drinking Water standards has been prepared and referenced in the revised Chapter 5. A copy of the consultant's report is included herein as Appendix C.

USNRC Issue No. 5: During a June 14, 2005 telephone conference, NRC staff advised SMC to evaluate the potential impacts associated with including the groundwater pathway before attempting to justify its exclusion. This comment was also reiterated in our June 24, 2005, letter to SMC (ML051680544). It is not clear if this was done in the DP.

SMC Response: SMC did indeed take the USNRC's advice and performed site-specific groundwater modeling to confirm whether there would be any impact of significance on the resulting dose if a hypothetical manufacturing facility opted to obtain its drinking water from an on-site well rather than Borough-supplied water. That effort, initiated prior to the submission of Rev. 1 of the DP to the USNRC, showed that the groundwater pathway, even if enabled, would have no significant radiological impact on hypothetical receptors.

[8] The groundwater at the SMC site contains hexavalent chromium, trichloroethylene and other constituents which, when compared to the National Primary Drinking Water standards defined in 40 CFR 141 and as referenced in Table M.8 and M.11 of NUREG-1757, Vol. 2, shows that it is not a potable water supply.

Action to be Taken: See actions taken in response to USNRC Issue No. 4. Appendix D contains a copy of the groundwater modeling analysis that was performed in response to the USNRC's request. It is being provided for staff information only and *is not* a part of Rev. 1a of the DP.

USNRC Issue No. 6: SMC was also advised to consider a scenario of a recreational user being exposed to a previously excavated portion of the pile when the land-use restriction fails. However, there is no discussion of this scenario in the DP.

SMC Response: One of the exposure scenarios evaluated in the DP (see Section 5.3.3.3) was an excavation scenario wherein the exposure potential for an intruder who attempts to excavate slag from under the engineered barrier is assessed. With that trigger in place, the dose potential to a resident living in the line of sight of the spot where the slag was excavated was also assessed as part of the excavation scenario. This was a scenario of interest to the New Jersey Department of Environmental Protection (NJDEP) staff.

The input parameters for modeling the dose to both the "nearby suburban resident" and the "recreational user" show that the former is limiting due, primarily, to the longer exposure duration. Since the total dose is directly proportional to the exposure duration, the nearby "suburban resident" and not the "recreational user" would have the greatest dose potential.

Action to be Taken: The dose to a hypothetical "recreational hunter" from a previously-excavated portion of the engineered barrier when land-use restrictions fail has been assessed and is included in Section 5.3.3.3 of Rev. 1 of the DP (see Appendix A of this attachment).

USNRC Issue No. 7: SMC failed to produce sufficient information showing that it met the regulatory requirements regarding the use of engineered barriers. (For one acceptable approach, see Guidance in NUREG-1623). Many of the technical analyses were incorrect and incomplete relative to surface water hydrology and design of erosion protection. For example, the Probable Maximum Precipitation and resulting Probable Maximum Flood runoff rates were incorrectly determined.

SMC Response: Appendix 19.3 of the DP included an evaluation of the worst-case maximum flow velocity based on the Probable Maximum Precipitation (PMP), using standard calculation methodologies that include those referenced in NUREG-1623. As the standards of 10 CFR Part 20, Subpart E are more performance-based than prescriptive, existing uranium mill guidance (e.g. NUREG-1623) is worthy of consideration for the analysis, but SMC maintains that it is not necessarily directly applicable to it. However, based on further discussions with the USNRC (see below), SMC understands that the USNRC is nonetheless requiring the use of more conservative parameters and methodologies in conducting the necessary analyses than those used by SMC in Appendix 19.3.

With respect to the Probable Maximum Flood (PMF) evaluation, based on the site's location near the headwaters of the Hudson Branch, flooding was not considered to be an issue with respect to the long-term integrity of the engineered barrier. Based on further discussions with the USNRC, SMC understands that a specific evaluation of the potential impact of flooding on the engineered barrier is nonetheless required.

Action to be Taken: SMC, SMC's consultant (TRC Environmental Corporation) and representatives of the USNRC had a technical meeting at the Newfield facility on April 11, 2006 to review existing site conditions and the required hydrologic evaluations. Representatives of NJDEP were also in attendance. Based on discussions held at that meeting, the PMP analysis has been re-evaluated using more stringent parameters and methodologies, as prescribed in NUREG-1623 and other associated reference documents. The design of the engineered barrier has been modified, as necessary, to provide the necessary protection against the erosive forces of the PMP and now incorporates a rock cover on the top slope, side slopes and apron at the toe of the side slopes. In addition, the geomembrane has been removed.[9] An evaluation of the potential impact of flooding on the engineered barrier under PMF conditions was also conducted.

The new engineering evaluations are attached hereto as Appendix E. As the estimated soil loss evaluation and erosion protection calculations of Rev. 1 of the DP are no longer applicable to a stone-covered barrier, all information currently present in Appendix 19.3 of all USNRC copies of the DP should be removed and replaced with the pages in Appendix E in order to upgrade the DP to Rev. 1a.

Similarly, selected sections in Chapter 8 have been revised to reflect the new engineered barrier design. Appendix F of this document contains the revised sections that should take the place of those that currently exist in all USNRC copies of Rev. 1 of the DP in order to upgrade it to Rev. 1a.

Figures 18.6, 18.7, 18.8 and 18.9 also required revision to reflect the new engineered barrier design. Appendix G of this document contains the revised figures. Figures 18.6 through 18.9 that currently exist in all USNRC copies of the DP should be removed and replaced with the figures in Appendix G in order to upgrade them to Rev. 1a.

USNRC Issue No. 8: The determinations of actual runoff velocities, relative to the permissible velocities, were not appropriate, based on inappropriate use of Manning's 'n' value, rainfall intensity, slope lengths, and flow concentration factors. Insufficient information was provided to address the flow velocities on the top slopes as well as the likely need for rock to be placed on the side slopes and on the toe of the side slopes.

SMC Response: See response to Issue No. 7.

Action to be Taken: See action to be taken with respect to Issue No. 7. The need for rock to be placed on the side slopes has been evaluated within the new analyses and more conservative design factors have been incorporated. Rock has been incorporated into the new engineered barrier design and separate evaluations are presented for the top slope, the side slope and the toe of the side slopes. See the Appendices referenced in the response to Issue No. 7 above for the revised evaluations.

USNRC Issue No. 9: Chapter 16 on restricted use includes very limited information about the proposed use of the long-term control (LTC) possession-only license and a supporting deed notice. Although the proposed LTC license could resolve one of the most significant issues that caused rejection of the first DP, SMC did

[9] Based on risk insights and because no credit can be taken for the features afforded by the geomembrane in the dose modeling, the geomembrane was deemed unessential and removed from the barrier design. The addition of the rock layer effectively retards erosion of the engineered barrier.

not provide important information about the LTC approach and restricting future site use that was described in NRC's interim guidance developed for this site and discussed with SMC.

SMC Response: Section 16.3.1 of the DP specifies that future use of the property will be that which is authorized by USNRC in the LTC license only. Section 16.3.2 states that the conditions of the LTC license will be specified in part, by the LTC Plan, to be submitted to the USNRC with the final decommissioning report. Restricting future site use, as outlined in Section 16.3.2 of the DP, will be accomplished by controlling access to the licensed materials through the use of an engineered barrier, a fence, warning signs, periodic surveillance, adverse event surveillance, maintaining a visitor log for access to the restricted area and periodic program reviews.

Action to be Taken: Section 16.3.1 has been modified to incorporate information about the LTC approach as described in the USNRC's interim guidance. Appendix H of this attachment contains a copy of the revised section. The Section 16.3.1 text that currently exists in all USNRC copies of the DP should be removed and replaced with the text in Appendix H in order to upgrade them to Rev. 1a.

USNRC Issue No. 10: Major areas with either missing or insufficient information include: (1) Eligibility for the LTC license option, including a demonstration that SMC was unable to arrange other types of institutional controls and independent third party arrangements, such as a letter from the State rejecting responsibility for ownership, control, or independent third party oversight (interim guidance, p. 4).

SMC Response: Concur.

Action to be Taken: On May 24, 2006, SMC forwarded a letter to the State of New Jersey asking if the State would accept responsibility for ownership, control or independent third-party oversight of the Newfield site. Appendix I contains a copy of that letter. To date SMC has received no response from the State.[10]

Section 16.2 has been revised (see Appendix H) to include a stronger justification of eligibility based upon SMC's inability to arrange for a viable independent third-party to serve as the institutional control. The Chapter 16.2 text that currently exists in all USNRC copies of the DP should be removed and replaced with the text in Appendix H in order to upgrade them to Rev. 1a.

USNRC Issue No. 11: Major areas with either missing or insufficient information include: (2) Although restrictions were simply listed, there was no justification given based on risk insights from dose assessments, such as specific access and land use scenarios that could lead to non-compliance with the dose criteria (interim guidance, p. 9).

SMC Response: Concur.

[10] On June 21, 2006, Nancy Wittenberg, Assistant Commissioner for the NJDEP, forwarded a letter of inquiry to Jack Strosnider, USNRC, wherein additional information on the role of the State as trustee for the funds set aside for long-term monitoring and maintenance. The NJDEP asked that a written response to the inquiries be provided before they would consider SMC's request.

Action to be Taken: Section 16.2 of Rev. 1 of the DP has been revised to link restrictions needed with the dose modeling results, and to show that the engineering components of the long term control license must be maintained and that they are sufficiently robust to remain protective over the long-term. Appendix H contains the revision to Section 16.2, which has been captured in Rev. 1a of the DP.

USNRC Issue No. 12: Major areas with either missing or insufficient information include: (3) Detriments to using the LTC license including stakeholder input (interim guidance, p. 11).

SMC Response: As described in section 16.5 of the DP, the SSAB was given multiple opportunities and methods for providing input to the decommissioning process, with emphasis on the specific lines of inquiry required in 10 CFR 20.1403(d).

Action to be Taken: The final paragraph in Section 16.5.4 (see Appendix H) has been revised to include a listing of detriments to using the LTC license based upon stakeholder input, summarized from elsewhere in section 16.5.4 of the DP (see Pg. 166 through 168). The Chapter 16.5.4 text that currently exists in all USNRC copies of the DP should be removed and replaced with the text in Appendix H in order to upgrade the DP to Rev. 1a.

USNRC Issue No. 13: Major areas with either missing or insufficient information include: (4) Demonstration that the engineered cap has been designed to be sufficiently robust to remain effective even assuming loss of monitoring and maintenance (interim guidance, p. 11) (see also comment above on erosion control).

SMC Response: See response to Issues No. 7 and No. 8.

Action to be Taken: See actions to be taken with respect to Issues No. 7 and 8. With the incorporation of a new engineered barrier design that includes the placement of rock on the top and side slopes as well as the toe of the side slopes, the accompanying engineering evaluations conducted in accordance with NUREG-1623 guidance demonstrate the protectiveness of these features, even without continued monitoring and maintenance. These revised evaluations clearly demonstrate the robustness of the engineered barrier.

USNRC Issue No. 14: NRC recognizes that SMC proposes to release the unrestricted use portion of the site rather than maintain it with the restricted use portion under the LTC license. NRC notes that SMC justified its position in response to the Site-Specific Advisory Board (SSAB) comments on this question, stating its position is based on sufficient financial assurance to pay for long-term monitoring and maintenance of the restricted area. NRC's interim guidance developed for this site and draft guidance in NUREG-1757 Supplement 1 were written to provide both protection and beneficial reuse of the total site. Both guidance documents explain that the LTC license would specify safe, and therefore, permitted uses of all parts of the site so there would be no uncertainty regarding safe use of the site by parties interested in leasing or purchasing the site in the future. Thus, there might be no restrictions on future use for the majority of the site area outside of the restricted area with the disposal cell. To help resolve this issue, SMC should describe the potential for reuse of the site as a whole under the LTC license.

SMC Response: In Section 16.5.4 of the DP (pages 166 and 167), the issue of potential re-use of the site under the LTC license if the license applied to the entirety of the site was addressed by both the SSAB and by SMC. Stakeholders and SMC are equally concerned about (1) whether anyone other than SMC would consider building a business on the site if faced with the need to become a USNRC licensee, and (2) the reduced tax revenue for the Borough if the property in its entirety remained underutilized for being subject to the LTC license. The radiological impacts on the "unrestricted" portion of the property, whether there is dual ownership or not would not change from that presented in Chapter 5 of the DP.

During multiple meetings with the SSAB, SMC listened to their concerns about permitted uses of all parts of the site and remains convinced that they believe the ability to subdivide and sell the unrestricted portions of property unencumbered by a radioactive materials license is critical to future redevelopment. Furthermore, sustaining the terms and conditions of the LTC license is independent of whether the property is subdivided or not because there will be sufficient financial assurance in place to enforce the LTC Plan.[11] Both the SSAB and SMC are convinced that future commercial interest in purchasing or developing property that would require the owner to maintain and pay for a USNRC license in perpetuity would be small, at best.

Action to be Taken: None.[12]

USNRC Issue No. 15: SMC should work with the SSAB to clearly discuss the pros and cons of this approach given in the NRC's draft guidance on page II-57, to ensure common understanding, as well as to identify how the whole site could be reused under the LTC license, real or perceived barriers to reuse, and, ways to resolve these barriers.

SMC Response: See response to USNRC Issue No. 14.

Action to be Taken: See actions taken in response to USNRC Issue No. 14.

USNRC Issue No. 16: SMC should also discuss how site ownership of the restricted use portion of the site would be sustained over the long-term, if it were separate from the rest of the site, to avoid gaps in ownership, and control, and to minimize NRC's active involvement to take actions if there is a gap.

SMC Response: See response to USNRC Issue No. 14. The licensee remains obliged to fulfill the terms and conditions of the LTC license, regardless of the property size. If that licensee fails to honor those terms and conditions, the USNRC would have enforcement options up to and including the use of funds from the trust to hire a contractor to fulfil license conditions. An LTC licensee that defaults would relinquish funds set aside in trust in the same way as any other USNRC licensee.

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[11] Under an LTC license, the important financial consideration is the economic viability of the licensee which is not necessarily the site owner. To the extent subdividing the property provides increased economic return, the economic viability of the licensee is maximized.

[12] During the March 9, 2006 meeting, both the USNRC and SMC agreed to consider this issue further. In addition, USNRC Staff stated that input from USNRC has been solicited and will presumably be forwarded to SMC.

Action to be Taken: See actions taken in response to USNRC Issue No. 14.

USNRC Issue No. 17: SMC should further explore both approaches with the SSAB and provide this additional information for NRC review.

SMC Response: See response to USNRC Issue No. 14 and 18.

Action to be Taken: See actions taken in response to USNRC Issue No. 14 and 18.

USNRC Issue No. 18: Although SMC provided information on use of institutional controls that it received from the SSAB, NRC recognizes that there was a general concern that not enough information was provided to the SSAB. SMC should take this opportunity to enhance its interactions with the SSAB, as it noted in responses to the SSAB input.

SMC Response: The SSAB did indeed state that they could not provide input in certain of the 10 CFR 20.1403(d) questions posed to them because they did not have an opportunity to review Rev. 1 of the DP. Because the SSAB's involvement in the planning process was necessary *before* the release of Rev. 1, SMC could not possibly comply with their request. However, SMC did provide the SSAB with a copy of Rev. 0 of the DP so that they could review the general approach and learn about the radiological and environmental conditions at the site, which remained relatively unchanged from Rev. 0 to Rev. 1. Rev. 1 of the DP was immediately posted on the SMC web site after its submission to the USNRC and has been available to the SSAB and other interested parties ever since.

During the last meeting of the SSAB, SMC asked whether the group was interested in meeting again. The response was a unanimous "no". Since then, however, SMC has received inquiries regarding future meetings of the SSAB, and has stated that it would be pleased to meet whenever the SSAB feels there is something to meet about. In the interim, SMC has been meeting with local legislators and officials to exchange information about the DP's objectives and to ensure as many stakeholders as possible are given an opportunity to participate in the process.

Action to be Taken: A follow-on meeting with the SSAB will be scheduled as soon as there is sufficient SSAB interest.

USNRC Issue No. 19: The staff is concerned that SMC did not provide sufficient rationale for it's alternative approach to meet the regulatory requirements for financial assurance. Specifically, SMC assumes a greater return on investment (ROI) than appears appropriate for the long-term surveillance and monitoring fund. The NRC's interim guidance (which represents one approach for meeting the regulations) applies a 1% ROI for the LTC license. However SMC used a 3% ROI. The higher ROI assumed by SMC reduces the amount placed in trust to cover long-term surveillance and monitoring costs, which increases the potential for inadequate funding in the event a string of losses occurs in the funds investments.

SMC Response: Because the return on investment primarily impacts the long-term maintenance fund, and because that fund is relatively small, the assumption of either a 1% or 3% ROI is not of major significance.

Action to be Taken: Attached to the USNRC's May 12, 2006 letter to SMC summarizing the March 9, 2006 meeting, the USNRC provides a staff assessment of the ROI issue, concluding that "to be acceptable, SMC's revised Decommissioning Plan must calculate the contribution to the decommissioning trust fund using a one percent rate of return." Based on that directive, a 1% ROI has been incorporated into the revised Decommissioning Plan cost estimates. New cost estimates (i.e., Tables 17.14, 17.15 and 17.16) have been prepared that reflect both the revised engineered barrier design and the 1% ROI. An adjustment to reflect increases in unit costs incurred between 2005 and 2006 has also been incorporated in the revised cost estimates.

As a change in the ROI only impacts cost estimates with long-term surveillance and monitoring components, only Tables 17.14 and 17.16 are impacted by the revised ROI. The new cost estimates are presented in Appendix B. The copies of Tables 17.14, 17.15 and 17.16 currently present in all USNRC copies of the DP should be removed and replaced with those in Appendix B in order to upgrade the DP to Rev. 1a.

Selected sections of Chapter 15 have also been revised to reflect the change in the ROI. The revised sections are attached hereto as Appendix J and should replace those in all USNRC copies of Rev. 1 of the DP in order to upgrade it to Rev. 1a.

USNRC Issue No. 20: Also, SMC did not specify whether it would include a 25%contingency in the long-term surveillance and monitoring fund.

SMC Response: As stated on page 151 of the DP, a 25% contingency was added to the total cost of all alternatives. Therefore, the 25% contingency was indeed added to *both* the capital cost and the long-term surveillance and monitoring costs components for the LTC Alternative. This is also indicated in the cost table (Table 17.14).

Action to be Taken: Existing text on the last bullet of page 151 of the DP has been reworded to read as follows: "In accordance with USNRC guidance, a 25% contingency has been added to the capital and long-term surveillance and monitoring costs of all alternatives." To clarify that the 25% contingency is added to both the capital costs and long-term maintenance and monitoring present worth costs, the cost estimates now include it as a separate line item under both the capital and long-term surveillance and monitoring sections, rather than as an individual line item applied to the total combined cost. The revisions to the cost estimate tables and the associated text of Section 15 are incorporated into the revised pages of Appendix B and J referenced in the response to Issue No. 19 in Rev. 1a of the DP.

USNRC Issue No. 21: The tables of decommissioning costs do not present sufficient detail to permit the NRC to assess the adequacy of the cost. The unit costs combine labor, material, equipment, and overhead and profit costs. NUREG-1757, Vol. 3 and the interim guidance developed for this site asks the licensee to present the cost elements separately.

SMC Response: NUREG-1757, Vol. 3 provides cost estimating tables that represent an action involving the decontamination/demolition of radioactive facility components, which is not always representative of the activities/costs involved in the proposed decommissioning of the SMC facility. For example, off-site disposal costs are not available to the level of detail requested. However, those

costs that are not based on lump sums or other information for which detail cannot be obtained can be presented in terms of labor, material, equipment and overhead and profit costs.

Action to be Taken: Revised cost tables that include the necessary breakdown, for those costs not based on lump sums or other information for which detail cannot be obtained, have been prepared. This additional information has been incorporated into the revised cost tables presented in Appendix B of this document, as previously referenced in the response to Issue No. 19, above.

USNRC Issue No. 22: The NRC staff also notes that the DP did not include a Certification Statement or an originally signed financial instrument to cover the decommissioning costs. The Certification is required as an affirmation that financial assurance has been provided, even though the licensee plans to pay for decommissioning out of operating funds. The Certification and originally signed financial instrument will be required before final approval of the DP.

SMC Response: Concur.

Action to be Taken: Section 15.2 of the DP has been modified to incorporate a Certification Statement. Appendix J shows the modification as it appears in Section 15.2 of the DP. Appendix K contains the signed original of the Certification Statement. A copy of the most recent statement from the trust showing its balance as of that date, as well as language from the Bankruptcy Settlement Agreement are also included in Appendix K for USNRC reference.

The various parameters used to describe the composition of each "layer" are defined within RESRAD with probabilistic variables. These, which account for the variability and uncertainty inherent in hydrogeological features, are described in detail in the subsections that follow.

5.2.2.2.1 Engineered Barrier Layer

The engineered barrier overlies the radionuclide-bearing consolidated material. It is comprised of a geomembrane and soil (native materials brought onto the site) and a rock cover for intruder and erosion protection installed pursuant to strict specifications. The thickness of the engineered barrier is modeled as a triangular distribution with a central tendency value of one (1) meter and a minimum and maximum of 0.9 and 1.2 meters, respectively. This thickness, while not expected to vary greatly over the area of the Storage Yard, will be an important consideration in the construction of the engineered barrier and will thus be confirmed routinely during construction to verify is remains uniform.

When modeling the subsurface-soil source term in RESRAD, the engineered barrier is identified as the "cover layer" since it overlies the contamination zone. Cover degradation is accounted for in RESRAD by a surface soil erosion rate parameter. The value used as input to the code was derived using the Revised Universal Soil Loss Equation computer program, version 2 (RUSLE 2), the MPV method (as recommended in NUREG-1623) and conservative input parameters.[95] Appendix 19.3 contains the findings of these analyses.

From assessment and calculation, the engineered barrier comprised only of a soil layer is clearly sufficiently robust to maintain its ability to shield the consolidated material under it from the population even if all controls for its maintenance and care should fail. Nonetheless, and in response to concerns raised by the USNRC, a redundant layer of protection in the form of a rock covering to further reduce the erosion rate and serve as an intruder barrier, is included in the design (see Section 8.3, below). However, no shielding credit for the presence of the rock cover is taken in the dose modeling described herein.

5.2.2.2.2 Contaminated Zone Layer

Residual radioactivity in the form of ferrocolumbium slag, baghouse dust, soil and contaminated building rubble will be consolidated within a portion of the existing Storage Yard and then capped with the engineered barrier. The contaminated zone will consist of 65,800 cubic meters of material, with a mean density of 2.8 g/cm^3 and a hydraulic conductivity of 2,000 meters per year.[96] These data were measured during the remedial investigation of the site and represent an average of the results from the multiple samples that were collected.[97]

Information regarding the partition coefficients (K_d) is provided in Section 5.4.3 and 5.24. Testing indicates that the radionuclides are tightly bound in the slag matrix and do not leach into water.

[95] TRC Environmental Corporation, *Estimated Soil Loss from Soil Cap*, Project Number 26770-0000, January, 2005.
[96] Table 17.1 provides a physical inventory of the materials to be consolidated in the restricted area.
[97] "Remedial Investigation Technical Report", TRC Environmental Consultants, Inc., 1992; Draft Final Feasibility Study Report, TRC Environmental Corporation, April 1995.

- Distance from the Storage Yard - The source term found in the site soils produces penetrating gamma radiation. Exposure from direct penetrating radiation is expected to be a significant contributor to the overall potential dose. External radiation dose was modeled using Microshield; RESRAD does not accurately model a direct exposure at a distance form the source term.

5.3.3.3 Barrier Excavation Scenario

Description of the Critical Group

The critical exposure group for the cover excavation scenario, which is considered to be an unlikely scenario, is described as a hypothetical person who excavates into the engineered barrier and exposes some of the slag.[164] The potential for exposure was evaluated in three different scenarios, including the immediate exposure to the excavator, the potential exposure to a recreational hunter after the cover is breached and the potential exposure to a family living nearby the damaged cap.

Exposure to the Excavator

It is assumed that an excavator climbs the fence surrounding the restricted area after institutional controls fail. The excavator then removes a portion of the engineered barrier to expose the buried slag, at which point he determines there is no further benefit in continuing and exits the area. While there, the excavator is assumed to excavate one (1) square meter ($1 m^2$) of the cover, including all its layers. It is assumed that the excavator uses manual excavation methods and that he is somehow able to cut or otherwise breach the geomembrane during the excavation process. The nominal footprint for the excavation (i.e., one square meter) would provide enough space for the excavator to climb down from the surface of the cover and onto the layer of exposed slag in order to confirm that further excavation would not be beneficial.

The person who excavates through the barrier is assumed to spend ten (10) work days at a rate of eight (8) hours per day, for a total of eighty (80) hours for this task.[165] It is assumed that one (1) square meter of the barrier is fully excavated, thus the excavator is exposed to a one (1) square meter surface of slag as he attempts to pulverize or chip the first boulder encountered. When the excavator is unsuccessful in removing the large, heavy pieces of slag using manual methods, excavation discontinues. Once refusal is reached, it is assumed that no slag is removed and that the excavated portion of the cap is not replaced.

Exposure to a Nearby Suburban Resident

Following the attempted excavation, it is assumed that the barrier is not repaired or returned to its original condition. The exposed surface of the slag is thus open to the environment and unshielded. The suburban resident family described in Section 5.3.3.2 lives within the line of sight from the

[164] It assumed that the cover may be excavated after institutional controls fail and that there is no maintenance or inspection of the cover over time. It is assumed that the person excavating the slag is doing so in an attempt to determine the intrinsic value and potential uses of the material. This individual may consider the material to be useful for landscaping or fill at a different location.

[165] A single individual, using hand-held excavating equipment, would be able to remove one square meter of the engineered barrier in this amount of time.

approximately 24 inches per year , corresponding to a most likely evapotranspiration coefficient of approximately 0.625 (average annual precipitation in the region is 42.05 inches).[182,183]

The evapotranspiration coefficient is conservatively represented with a uniform distribution ranging between 0.3 and 0.9 which is a greater range than recommended by RESRAD. SMC determined that the national average of 0.5 is appropriate for the Newfield site.

Wind Speed

Average annual wind speed is used to calculate the dose from the inhalation pathway. The wind speed is used to transport airborne dust generated on site in a standard air dispersion model. Through the transport calculations, the radioactive fraction of the total dust loading in air is derived. The fraction is then used to calculate particle inhalation intake.

While wind speeds do vary from day-to-day and season-to-season, the annual average wind speed is reasonably steadfast. Data from the National Climate Data Center from Philadelphia, Pennsylvania were reviewed from 1971 through 2000. The mean annual wind speed was reported to be 9.6 miles per hour (4.3 meters/sec). Sensitivity analysis shows that the inhalation pathway is insensitive to this parameter because, the residual radioactivity is effectively isolated by the covering layer such that radioactive particle suspension is minor. As a result, the inhalation pathway is not a significant contributor to total annual dose. Wind speed is represented with the RESRAD default (4.25 m/sec), bounded lognormal-N distribution.

Runoff Coefficient

The runoff coefficient is one of a number of parameters used to calculate the amount of water that is allowed to enter the contaminated zone and ultimately an estimate of the radionuclide leaching from the contaminated zone. It is the fraction of precipitation that does not penetrate the top soil layer; the lower the fraction, the more water is allowed to co-mingle with the contaminated zone. The runoff coefficient (RUNOFF) varies with topography, precipitation patterns in the region, and soil type. The runoff coefficient is 1 when a geomembrane is used.

Runoff coefficient is represented with the RESRAD default parameter distribution, a uniform distribution ranging between 0.1 and 0.8 (10% to 80% of precipitation runs off without penetrating the surface). Considering the mounded topography of the site and the presence of the engineered barrier over the consolidated radioactivity, the true range is likely to be much narrower and near the maximum value (80%) considered in the probability distribution.

Depth of Soil Mixing Layer

This parameter (DM) is used in calculating the depth factor for the dust inhalation and soil ingestion pathways and for foliar deposition for the ingestion pathways. The depth factor is the fraction of resuspendable soil particles at the ground surface that are contaminated, which is calculated by

[182] Yu, C, et al, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil*, ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois, April, 1993.
[183] National Climatological Data Center, 1940 through 2003 (Philadelphia).

assuming that mixing of the soil will occur within a layer of thickness, DM, at the surface. The RESRAD default distribution (triangular) and range (0 to 0.6 m) was used.

Cover Depth (Thickness)

When modeling the source term, the cover depth (thickness) is a key parameter in assessing the protectiveness of the chosen decommissioning alternative as it provides a barrier to potential physical contact with residual radioactivity in the slag materials located within the cell, and a substantial degree of gamma radiation attenuation for the penetrating gamma radiation exposure pathway, the dominant, or critical dose pathway. RESRAD does not suggest a default probability distribution for cover depth (COVERO) as it is dependant upon site-specific conditions and for the unrestricted area, does not exist at all. Thus, SMC has conservatively chosen to represent this parameter with a triangular distribution ranging between 0.5 and 1.2 meters thick and with a most likely value of 1 meters (3.3 ft.). This representation is conservative in that the thickness value used does not include the topsoil layer to support natural succession vegetation as an erosion control mechanism. Sensitivity analysis reveals that the "cover penetrating gamma radiation dose" pathway, and as a result the total annual effective dose equivalent, is sensitive to this parameter.

Cover Soil Density

The engineered cover is comprised of a combination of soil and the geomembrane. The soil density at the site was measured to arrive at a site-specific estimate of the soil density of both the cover material and the undisturbed surface layer. The measured soil density was found to be 1.9 g/cm^3. Sensitivity analysis showed that annual dose was insensitive to a wide range of soil densities. Since site-specific data was available for the materials at the site, these were used to describe the density of the cover soil layer. Cover soil density (DENSCV) was represented with a truncated normal distribution (the RESRAD default). The mean was set equal to the measured density of 1.9 g/cm^3 with a truncated normal distribution and a standard deviation of 0.23; the RESRAD program allows the density of the cover to range between approximately 1.46 to 2.33 g/cm^3.

Surface Soil Erosion Rate

When modeling the engineered barrier, the conceptual site model includes a relatively thick cover layer that is engineered to resist the forces of erosion. In this case, the surface soil layer is the engineered cover layer and the surface soil erosion rate is captured in two important parameters within the RESRAD model. The cover layer erosion rate (VCV) is important because as cover erosion occurs, the underlying contaminated zone is exposed, increasing the potential for human exposure to radiation.[184] Once the cover layer has been eroded, RESRAD further accounts for the effect of surface soil erosion through the contaminated zone erosion rate parameter (VCZ).

[184] It is important to note that once the cover soil is eroded, the underlying contaminated zone will not be immediately exposed because of the geomembrane. And if just a small area of geomembrane were to be exposed, it is unlikely that the protective nature of the geomembrane would be degraded or compromised or a very long time.. However, if a larger area of geomembrane was exposed, it is possible that an edge of the geomembrane could come loose thus exposing the underlying contaminated zone.

is maintained. [103] Therefore, the SMC site will be comprised of both an unrestricted use area and a restricted use area where legally-enforceable and durable institutional controls are required. The size of the restricted area has been minimized to a footprint that immediately surrounds the engineered barrier.

16.3.1 Description of Legally-Enforceable and Durable Institutional Controls

The primary means of ensuring institutional control over the restricted area of the decommissioned Newfield site will be perpetual federal regulation and oversight of the provisions outlined herein. The form of control will be the amendment of License No. SMB-743 to a LTC license. This license, to be issued by a federal (US) regulatory agency (i.e., the USNRC), has the force of law. The USNRC, in guidance supplied to SMC, has agreed to issue the LTC license as part of the overall approval of this Decommissioning Plan.

The secondary means of ensuring institutional control is the filing of a deed notice with Gloucester County that prohibits agricultural, residential and industrial activities within the restricted area, or any other activities that might result in the removal or breech of the engineered barrier. It will also contain a statement that no land use other than that specified in Section 16.4, below, is permitted for within the restricted area. The contents of the deed notice will be prepared and submitted for USNRC approval as part of the final decommissioning and final status survey report (see Section 14.3.15). Once filed, it will also serve to alert any future landowners owners that the property brings with it all of the obligations of License No. SMB-743.

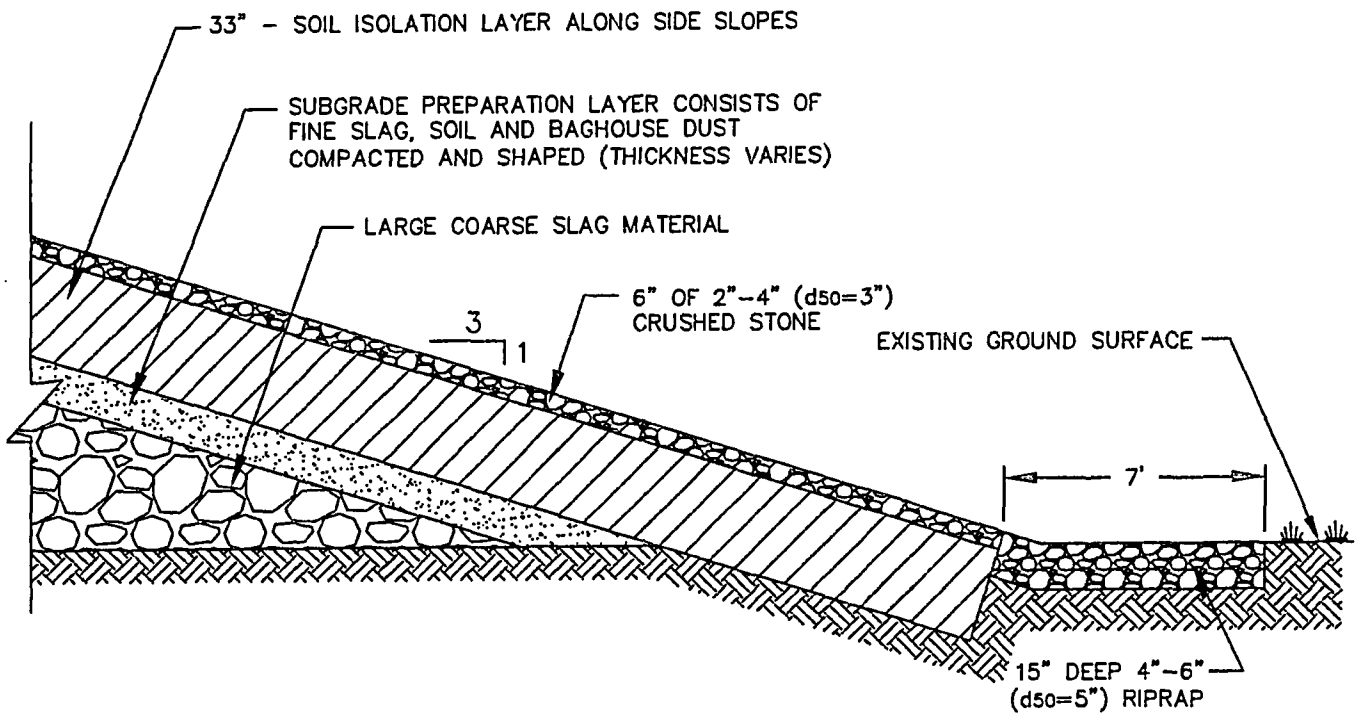
The duration of these controls will be permanent in light of the long half-life of the radioactivity consolidated under the engineered barrier. However, the LTC license will be renewed in five-year increments. Independent oversight of SMC's performance in light of LTC license requirements will be provided by the USNRC during routine inspections and license renewal activities. In the event of SMC default in the terms and conditions of the LTC license, the USNRC has the authority to terminate the license, assume control of the funds held in trust, and contract the services of a third party to implement the license requirements.

16.3.2 Activities to Control Access

To control access to and use of the restricted area while under SMC ownership, a variety of institutional controls, including physical, legal, and administrative mechanisms as described in the following, will be implemented:

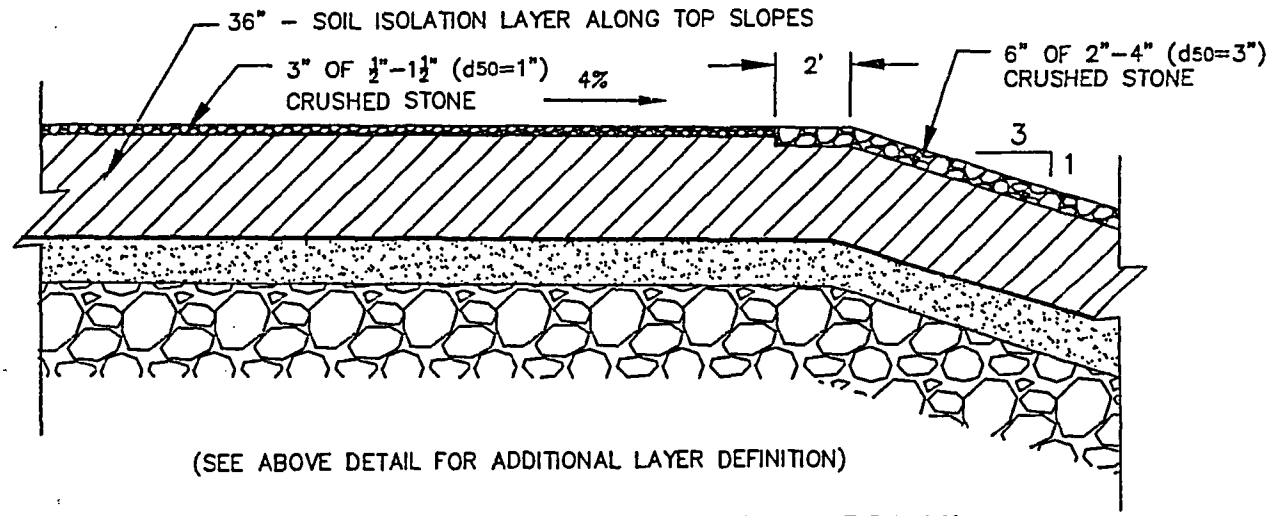
- SMC will control access to and activities on the engineered barrier through the use of fencing.
- Warning signs will be posted along the fence line and at all access points (gates).

[103] The hazard classification even if the engineered barrier should fail, would still not be considered a "high hazard" level (see Chapter 5), although it would be somewhat higher than with the barrier in place on a dose basis alone.



TYPICAL ENGINEERED BARRIER SIDE SLOPE DETAIL

N.T.S.



TYPICAL ENGINEERED BARRIER TOP DETAIL

N.T.S.

TRC Customer-Focused Solutions
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL
NEWFIELD, NEW JERSEY

FIGURE 18.8
ENGINEERED BARRIER CONSTRUCTION DETAILS

Date: 06/06 | Project No. 26770-0000-00000

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FIG-18.8 v3.dwg Layout:Model June 21, 2006–4:25PM KHOLLENBECK

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1 **Appendix 19.9 - Environmental Report**

Environmental Report for the Newfield Facility

Submitted by:

Shieldalloy Metallurgical Corporation
35 South West Boulevard
Newfield, New Jersey 08344
856-692-4200

October 21, 2005

1.0 INTRODUCTION

1.1 The Proposed Action

The National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.) requires Federal agencies, as part of their decision-making process, to consider the environmental impacts of actions under their jurisdiction. The U.S. Nuclear Regulatory Commission (USNRC) has developed a guidance document, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report (NUREG-1748), to guide the preparation of Environmental Reports under the environmental review process. This document has been prepared to address the NUREG-1748 guidance for proposed decommissioning activities at the Shieldalloy Metallurgical Corporation (SMC) facility in Newfield, New Jersey.

The SMC facility holds a USNRC radioactive materials license (USNRC License No. SMB-743) that authorizes the possession of up to 303,050 kilograms of thorium in any chemical/physical form, and up to 45,000 kilograms of uranium in any chemical or physical form. As of October 17, 2005, SMC was at 96.8% of the thorium limit and 87.6% of the uranium limit. The majority of the licensed radioactive material inventory at the facility consists of slag from the former D-111 production department and dust from the former D-111 baghouses. The remainder is soil and surface-contaminated concrete from on-site remediation activities.

The proposed action to be implemented under the Decommissioning Plan consists of on-site stabilization of the residual radioactivity, followed by long-term control. Under this action, all residual radioactive materials at the SMC facility will be consolidated in the existing Storage Yard in the eastern part of the facility, where the majority of the materials are currently located. The materials will be graded, covered with an engineered barrier, and subject to long-term maintenance. Following the completion of the engineered barrier, land use restrictions and institutional controls, via the issuance of a "possession only" radioactive materials license by the USNRC, hereinafter referred to as a "Long Term Control" or LTC license, will ensure long-term protection of the public and the environment.

December 5, 2008

MEMORANDUM TO: Rebecca Tadesse, Branch Chief
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

FROM: John J. Hayes, Senior Project Manager **/RA/**
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: NOVEMBER 20, 2008 PUBLIC MEETING SUMMARY

On November 20, 2008, a public meeting was held at the Shieldalloy Metallurgical Corporation's Office in Newfield, NJ. The meeting was held between the U.S. Nuclear Regulatory Commission's (NRC's) Shieldalloy Decommissioning Plan Review Team and representatives of the Shieldalloy Metallurgical Corporation (SMC) and its contractors. The purpose of the meeting was to discuss the draft Requests for Additional Information (RAIs) associated with the NRC's review of the Cost-Benefit aspects of the NRC's Environmental Report and the As Low As Reasonably Achievable issue associated with the Decommissioning Plan. Also discussed was one question involving mixed waste being present at the Shieldalloy site.

The meeting focused on the determination of whether the information being requested by the NRC was clear to SMC or whether additional clarification needed to be provided prior to submitting the RAIs to SMC in final form. The discussion also provided the opportunity for SMC to identify if some of the information being requested by the staff was contained in existing Shieldalloy documents provided to the staff in support of the Decommissioning Plan review. As a result of the meeting, some of the RAIs will be revised and re-stated. Others are being assessed for possible deletion. At the conclusion of the meeting, members of the public were provided the opportunity to make statements in accordance with the guidelines associated with a NRC Category 1 meeting.

Enclosure 1 is the Attendee List (ML083260582). The agenda for the meeting is available at ML083120310. Enclosure 2 is the draft RAIs which were discussed during the meeting

The meeting adjourned at 5:00 PM
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CONTACT: John J. Hayes, FSME/DWMEP
(301) 415-5928

Enclosures:
1. Attendee List
2. RAI for Discussion
3. Supplemental RAI

MEMORANDUM TO: Rebecca Tadesse, Branch Chief
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

FROM: John J. Hayes, Senior Project Manager
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
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Enclosure 1 is the Attendee List (ML083260582). The agenda for the meeting is available at ML083120310. Enclosure 2 and 3 are the draft and supplemental RAIs which were discussed during the meeting.

The meeting adjourned at 5:00 PM.

Enclosures:
1. Attendee List
2. RAI for Discussion
3. Supplemental RAI

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ML083260593

Office	DWMEP	DWMEP	DWMEP	DWMEP	DWMEP
Name	JHayes	AFetter	SMichonski	RTadesse	JHayes
Date	12 / 01/08	12/01/08/	11/21/08	12/05/08	12/05/08

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1. For ALARA Evaluation for Restricted Use, Provide Discussion of Need for Radon Mitigation Techniques as Part of Institutional Controls

Basis:
Chapter 5 (with associated Tables) of the DP indicates that SMC eliminated the radon pathway from all exposure scenarios evaluated. Justification is provided in Section 5.3.2.1 and Table 17.4 of the DP (Rev. 1). In Section 5.3.2.1, SMC states that, in the Statements of Consideration (SOC) for the License Termination Rule (LTR), the NRC staff documented concurrence with eliminating the radon pathway for outdoor exposure scenarios. The SOC was published in the *Federal Register* (FR) (at 62FR39057, dated July 21, 1997). SMC quotes part of a passage from Section F.6.3 of the SOC, which discusses comments on the proposed rule and how radon is to be addressed under the final rule. However, what SMC quoted neglected key parts of the Section F.6.3 discussion in the SOC. The following is the complete conclusion of Section F.6.3 of the SOC, starting with the last sentence SMC had quoted (emphasis added below by NRC staff).

> Therefore, in implementing the final rule, licensees will not be expected to demonstrate that radon from licensed activities is indistinguishable from background on a site-specific basis. Instead this may be considered to have been demonstrated on a generic basis when radium, the principal precursor to radon, meets the requirements <u>for unrestricted release</u>, without including doses from the radon pathway.
>
> In some instances it may not be reasonable to achieve levels of residual concentrations of radon precursors within the limit for unrestricted use. As discussed in Section IV.B for cases such as these, restricting site use by use of institutional controls could be considered by a licensee as a means to limit the doses from precursors by limiting access to the site. Under the <u>restricted use</u> provisions of the rule, these doses are required to be further reduced based on ALARA principles. In developing guidance on the application of ALARA in such cases, the Commission will also consider the practicality of requiring <u>as part of controls</u> the use of radon mitigation techniques in existing or future structures.

The NRC staff disagrees with SMC's statement that NRC had concurred on elimination of the radon pathway for outdoor scenarios. The point made in the SOC was that the radon pathway did not need to be addressed for sites otherwise meeting the *unrestricted use* criterion (of 10 CFR 20.1402). SMC has proposed license termination for the Shieldalloy site under both unrestricted and *restricted use* provisions. The NRC staff has concluded that SMC's understanding of the SOC regarding the radon pathway for the SMC site is incorrect.

However, based on the SOC discussed above, the NRC staff believes that the radon pathway *does not* need to be included *in the dose assessment* for the SMC facility. Instead, the NRC staff believes that the radon pathway only needs to be addressed as part of the ALARA evaluation. Specifically, the NRC staff believes that the ALARA evaluation for compliance with §20.1403(a) (restricted use) should consider the practicality of radon mitigation techniques in structures as part of the institutional controls proposed for the site.

Path Forward:
In its ALARA evaluation for compliance with §20.1403(a), SMC should include consideration of the need for and practicality of radon mitigation techniques in structures as part of the institutional controls proposed for the site.

2. Provide Details of the Determination of Dose from Current Radon Releases

Basis:
In the ALARA analysis of the DP (Rev. 1), Section 7.2.1.2 describes estimates of current doses to members of the public around the SMC site. This section states that a nominal dose rate from radon emanation from baghouse dust is approximately 8.2×10^{-3} microR per hour. The DP does not describe how this value was determined (though there is reference to a quarterly monitoring report). The NRC staff notes that in replying to the Commission on July 3, 2008, regarding an ASLB memorandum, SMC described a recent dose assessment for doses to members of the public. In this latter case, SMC cited a report by integrated Environmental Management, Inc, "Prospective Dose Assessment for members of the Public," dated May 21, 2008.

The NRC staff has two concerns about the dose from radon stated in the DP. First, the DP text indicated that this dose was from radon emissions from baghouse dust. The concentrations of radium (Ra-226 and Ra-228) in some of the slag materials appear to be significantly higher than in the baghouse dust. During visits to the SMC site this summer, NRC staff observed that some of the slag is physically degrading, which may be an indication that radon produced in the slag may readily escape the slag matrix and emanate into the atmosphere. Second, the dose rate (technically, an exposure rate was indicated) stated in the DP seems to NRC staff to be very low (relative to the Ra-226 concentrations in the SMC materials, and based on previous experiences with uranium mill tailings), and the NRC staff is concerned that the value may be unrealistically low. Without details of the evaluation, the NRC staff cannot adequately assess the value.

Path Forward:
Provide to the NRC staff the cited reports and/or the reports which describe how the radon dose estimates were determined. Provide the calculations if they are not in the reports. Provide the justification for basing the limiting dose on the baghouse dust material.

3. Provide Justification for Criteria for Release of Materials and Equipment

Basis:
In July 5, 2007 NRC letter, RAI 59 requested information about SMC's proposed criteria for releasing volumetrically contaminated materials and equipment because the Shieldalloy DP included criteria that were applicable only to surface-contaminated materials and equipment. In SMC's November 9, 2007 response, they proposed to use criteria from ANS/HPS N13.12-1999, "Surface and Volume Radioactivity Standards for Clearance," for surface-contaminated and for volumetrically contaminated materials and equipment. The NRC staff has not endorsed use of this ANSI/HPS standard for clearance of materials and equipment.

The criteria proposed by SMC in Section 14.2.1 of the DP (Rev. 1) were acceptable to the NRC staff for application to *surface-contaminated* materials and equipment. The NRC staff's current guidance on criteria for release of contaminated materials and

equipment is contained in Section 15.11 of NUREG-1757, "Consolidated Decommissioning Guidance," Volume 1, Revision 2. The NRC staff understands, from phone conference calls with SMC, that concrete may be the material for which the volumetrically contaminated criteria may need to apply. NUREG-1640 provides descriptions of dose assessments for unrestricted release of concrete. SMC might wish to review the information in NUREG-1640 as a possible resource for developing release criteria for volumetrically contaminated materials consistent with the guidance of NUREG-1757.

Path Forward:
Provide justification for the criteria to be used for release of surface-contaminated and volumetrically contaminated materials and equipment. If SMC proposes use of the criteria in ANSI/HPS N13.12 or some other criteria (not previously approved), SMC should provide independent justification, including a dose assessment, following the guidance in Section 15.11 of NUREG-1757, Vol.1, Rev. 2.

4. Provide ALARA Evaluation for Unrestricted-Use Portion of the Site

Basis:
The proposed approach to decommission the SMC site includes cleanup of a portion of the site for release from the license for unrestricted use. The LTR criteria for unrestricted use termination, in 10 CFR 20.1402, includes that the residual radioactivity has been reduced to levels that are ALARA. Chapter 7 of the DP discusses the ALARA evaluation that SMC performed. The discussion in Chapter 7 focuses on the evaluation for the proposed restricted use portion of the site and does not include discussion of an ALARA evaluation for the unrestricted portion of the site.

Path Forward:
Provide an ALARA evaluation for the unrestricted-use portion of the proposed site decommissioning, to show how SMC plans to comply with the ALARA provision of §20.1402. NRC staff guidance on ALARA for license termination criteria is provided in Chapter 6 and Appendix N of NUREG-1757, Vol. 2, Rev. 1.

5. For the ALARA Evaluation for the Eligibility Criteria of 10 CFR 20.1403(a): Provide Additional Quantification or Details on Regulatory Costs

Basis:
The DP (Rev. 1), in Section 7.3.7, provides a brief discussion of regulatory costs that relate to the ALARA evaluation for the restricted use requirements of 10 CFR 20.1403(a). However, SMC has not quantified any of the regulatory costs. The NRC staff believes that Information should be available with which SMC could estimate these regulatory costs. Because the regulatory costs can be significant, and could vary considerably between the decommissioning options being evaluated, quantifying these costs could be important to the overall ALARA evaluation.

Path Forward:
Provide additional quantification of the regulatory costs for the different decommissioning options being evaluated as part of the ALARA evaluation for the eligibility criteria of §20.1403(a).

6. Justification for Excluding Radon Pathway from Dose Assessment is Technically Incorrect

Basis:
In Table 17.4 of the DP, SMC provides an argument for excluding the radon pathway (in addition to the argument based on the Statements of Consideration for the LTR, discussed in a previous RAI 1 above). In the Table, it was stated: "In addition, the source term found is not a significant producer of radon due to the relatively long half-life of the thorium isotopes found in the slag." The fact that the source term includes long half-life isotopes does *not* preclude radon from being produced or being a contributor to dose. In fact, the long half life of the thorium isotopes (along with the relatively short half life of the radon isotopes) means that radon will be produced for a long time. Therefore, the argument proposed in Table 17.4 is not justified.

Path Forward:
In its revision to the DP, SMC should correct this technical inaccuracy. See also the related RAI 1 above regarding ALARA and the radon pathway.

Supplemental Request for Additional Information
Shieldalloy Metallurgical Corporation
Docket No. 04007102

The U.S. Nuclear Regulatory Commission (NRC) staff is conducting its environmental review of Shieldalloy Metallurgical Corporation's (SMC's) proposed plan for decommissioning its Newfield, New Jersey site in support of preparing the Environmental Impact Statement (EIS). In October 2005, SMC submitted a Decommissioning Plan (DP) (Rev 1) and a draft Environmental Report (ER). On June 30, 2006, a supplemental DP (Rev 1a) was submitted. SMC also intends to submit an additional supplemental DP (Rev 1b) in April or May 2009. Based on NRC staff review of these reports, previously submitted information and anticipated information to be provided in DP (Rev 1b), the NRC staff has developed a supplemental request for additional information to support its evaluation of the potential environmental impacts of SMC's proposed DP and alternatives.

Cost Estimate RAIs Based on Shieldalloy Cost Estimates Provided in Decommissioning Plan, Rev1a and Rev 1b Interim

Action needed to complete the staff's review: Shieldalloy needs to update the cost estimates and provide the detailed cost bases and applicable references for their cost estimates in Tables 17.14, 17.15, 17.16 in the Decommissioning Plan, Rev 1a, and specifically address the comments/questions in the comment tables.

Basis or bases why the information is needed: The major costs and benefits of each alternative must be considered in the EIS in accordance with 10 CFR 51.71. The cost benefit analysis provides input to determine the relative merits of various alternatives. The comments on the LTC, LT, and LC alternative cost estimates need to be provided in order to fully and objectively evaluate the costing portion of these alternatives. An evaluation of the cost estimates is critical as they directly impact the cost-benefit analysis.

Requirement/criteria for the information: Shieldalloy needs to provide supporting documentation and references where applicable.

Comments on Table 17.14 – Cost Estimate for the LTC (Long Term Control) Alternative

1. Please provide references for all line item costs.
2. It is our understanding that Area/Piles #10 and #11 would be included in this alternative. However, the quantity estimates do not include these piles. Area/Pile #11 is located outside of the Storage Yard on Figure 1-6 of the ER (SMC 2005), however, it is not listed on Table 1-1 of the same report. Based on review of DP Rev 1b, the Design Drawings do not discuss either Area/Piles #10 or #11. Please clarify.
3. Explain how the area for dust suppression was quantified. The quantity (28,000 SY) of dust suppression on haul roads seems large if just haul roads are being considered. Does the dust suppression line item apply to material within the restricted area as well; not just haul roads? This is alluded to in the DP Rev 1, pg 97, 2nd para. Additionally, describe the equipment/materials that are proposed to suppress the dust? (ER p 1-8).

4. Are the haul roads being referred to above the same as those referred to on page 1-8 of the ER and shown on Figure 1-5 of the same report (highlighted in green and perpendicular to Weymouth Road)? Does this road still exist after portions of the road were excavated prior to 1998 (ER, pg 1-8)? If the haul roads don't exist, please add construction of the haul roads to the estimate. Suggest identifying the haul roads on the LTC alternative figure.
5. Please explain why radiological and air monitoring are proposed for only 13 weeks if construction is to occur over 7 months.
6. Please provide the cost basis for the Radiological and Air Monitoring line item. Include the number of monitors and their unit rate. The unit cost component for labor allows for one person for 3 hrs/day @$100/hr or 2 hrs/day @ $150/hr – are the remaining hours per day for this person included in another line item (a line item for health and safety is not included)? Do the labor hours include the on-site analysis of air filter samples and has the counting equipment been included in the cost estimate, or will the samples be sent to an off-site lab and have analytical costs been included?
7. Please provide the cost basis for the Additional Soil Characterization line item.
8. Please explain the rationale for the three different unit costs for grading and why #1 is so much higher than the others: 1) Rough Grading of Coarse Slag @ $6.74/SY, 2) Grading of Subgrade Cap Materials @ $0.26/SY, 3) Grading @ $0.36/SY (in Table 17.15).
9. Please provide the basis for the materials, labor, and equipment costs for the Final Status Survey (FSS). The ER states that an FSS will be performed for the entire plant, which would include building and soil surveys. Were the analytical costs included in this estimate? Explain why the FSS is the same cost for the LTC alternative and the LT alternative since the footprint of the consolidated materials pile would not be included in the FSS for the LTC alternative.
10. Although the text indicates fencing is included, it is not included as a line item. Please add the cost of fencing as a line item. [DP Rev 1, pg 150, last bullet]
11. Explain why the line item Fine Grade, Seed and Mulch is referred to in a volumetric unit (CY) when typically it is estimated in SY or acres. The value given,18,300 CY, is three times the volume of topsoil to be used in areas outside the consolidated materials pile, which seems unreasonable unless Fine Grade, Seed, and Mulch are to be applied to an area larger than the topsoil area. Define the area to be covered by the seed and mulch.
12. Please provide a line item for preparation of a final topo survey once the engineered barrier is complete (to be used for as-builts).
13. The 5% markup for Admin Costs ($90.8K) is assumed to include a secretary in the field or in the office. Assumed costs for a secretary of loaded $40/hr*8hr/day*5days/wk*4wk/mo*7mo = $45K (vs $90.8K in Table 17.14). Is it anticipated that the remaining $45K will be enough to support additional subcontracting, invoicing, timekeeping, expense reporting, etc. services necessary for this project?
14. The 10% markup for Project Management During Construction ($181.6K) appears to be low. For this project it would be expected that a field project manager and a field engineer would be needed, plus corporate project management. Please provide a breakdown of the elements of this cost, including basic wages and benefits, overhead, and contractor profit (sufficient to allow an independent third-party to carry out the decommissioning [NUREG 1757, Vol 3, Section A.3.1.2]).
15. For permits and legal documentation, explain what is included in the estimated cost of ~$200K.

16. Explain what is included in the Engineering Design Costs of $200K. If it includes Work Plans, H&S Plans, O&M Plans, Soil Management Plans, continuous scheduling updates, etc., the cost appears to be low.
17. Section 9.3.2.1 of the DP, Rev 1, indicates that radiological, industrial hygiene and industrial safety support will be provided, but there are no line item costs for health and safety. Please provide these costs.
18. Is groundwater monitoring included in the annual O&M costs? If not, please estimate and add a line item for groundwater monitoring.
19. Explain how overhead and profit (O&P) was applied to each line item. Most items have ~25% O&P added to the base costs. In other cases, it is 17% (DP Rev 1a, Table 17.14, Sediment and Erosion Controls) or 31% (DP Rev 1a, Table 17.14, Drainage Improvements) or other. The text states a universal 25% O&P factor applied to most unit costs, with certain activities requiring higher health and safety precautions thus labor and equipment productivity were reduced by 45% and 25% respectively (DP Rev1, pg 150, 4th bullet). Explain how the reduced productivity rates were incorporated into the unit costs. O&P factors >25% are reasonable; O&P factors <25% are not typical.
20. Explain the rationale for the markup percentage chosen for each estimate, as they vary between estimates. For example, Engineering Design costs are 10% of the construction costs in Table 17.14 (LTC alternative); whereas it is 2% in Table 17.15 (LT alternative). A similar situation exists for other markups.
21. Clarify CY line items to be loose (LCY) or bank (BCY) as this would add a level of accuracy to the estimate.
22. Provide the reference for the 1996 mobe and demobe costs.
23. Indicate whether all non labor costs have been addressed as specified in NUREG 1757 .
24. Indicate if and where non-labor costs (e.g. PPE, shipping, taxes, insurance [NUREG 1757, Vol 3, Appendix A, pg A-28]) and field support items such as field trailers/portable toilets/computers/ electricity/water etc. have been included in the estimate. If they have not been included, add line items for these costs.

Comments on Table 17.15 – Cost Estimate for the LT (License Termination) Alternative

1. It is our understanding that Area/Piles #10 and #11 would be included in this alternative. However, the quantity estimates do not include these piles.
2. Explain why the mobe cost is the same in this alternative as in the LTC alternative. Explain why demobe is more expensive than mobe in this alternative.
3. Explain the logistics of loading the rail cars and transporting off site. For example, is there enough track to hold the number of railcars to be loaded at any given time or should costs for additional track be added? Since the track dead ends at the site and there is one way in and one way out for the cars, how does SMC/EnergySolutions plan to logistically load the railcars and transport off-site? Is there enough room for the 10 railcars? Is a car puller to be utilized or will the switcher be used to maneuver railcars?
4. For railway transport, indicate if and where the costs for loading scales have been included in the cost.
5. Based on the quantities given, there are 3,000 crossties proposed for 2,400LF of track. Therefore, each crosstie is to be placed every ~9 inches. Based on RS Means (2008, Assembly R347216-10), timber crossties are typically placed every 22 inches on center. Please explain.

6. Clarify whether the Railcar Switcher unit cost includes labor.
7. For the Radiological and Air Monitoring item, explain why the costs are different for LT and LTC alternatives and explain the basis for the cost. Include the number of monitors and their unit rate. The unit cost component for labor allows for one person for 3 hrs/day @$100/hr or 2 hrs/day @ $150/hr – are the remaining hours per day for this person included in another line item (a line item for health and safety has not been included in the estimate)? Do the labor hours include the on-site analysis of air filter samples and has the counting equipment been included in the cost estimate, or will the samples be sent to an off-site lab and have analytical costs been included?
8. Provide the costs to be added to construct the staging area as it is currently proposed in a grassy area, e.g., include poly, concrete pad, gravel base, gravel entrance/exit, etc. If the paved areas immediately adjacent (to the west) will be used as well, include costs for preparation of that area (there are cracks in the existing pavement). Also, describe the plan and costs for secondary containment and storm water management measures in the staging area.
9. Explain why mulch is not included in site restoration as was done for the LTC alternative.
10. Please include costs for a survey crew for railroad installation.
11. Drainage improvements for the LT alternative are included in Table 17.15 at the same cost as presented in Table 17.14, however, drainage improvements are not described in the text for the LT alternative.
12. For permits and legal documentation, explain what is included in the estimated cost of $475K.
13. Explain what is included in the Engineering Design Costs of $200K. If it includes Work Plans, H&S Plans, O&M Plans, Soil Management Plans, continuous scheduling updates, etc., the cost appears to be low.
14. Section 9.3.2.1 of the DP, Rev 1, indicates that radiological, industrial hygiene, and industrial safety support will be provided, but there are no line item costs for health and safety. Please provide these costs.
15. Explain how overhead and profit (O&P) was applied to each line item. Most items have ~25% O&P added to the base costs. In other cases, it is 17% (DP Rev 1a, Table 17.14, Sediment and Erosion Controls) or 31% (DP Rev 1a, Table 17.14, Drainage Improvements) or other. The text states a universal 25% O&P factor applied to most unit costs, with certain activities requiring higher health and safety precautions thus labor and equipment productivity were reduced by 45% and 25% respectively (DP Rev1, pg 150, 4th bullet). Explain how the reduced productivity rates were incorporated into the unit costs. O&P factors >25% are reasonable; O&P factors <25% are not typical.
16. Explain the rationale for the markup percentage chosen for each estimate, as they vary between estimates. For example, Engineering Design costs are 10% of the construction costs in Table 17.14 (LTC alternative); whereas they are 2% in Table 17.15 (LT alternative). A similar situation exists for other markups.
17. Clarify CY line items to be loose (LCY) or bank (BCY) as this would add a level of accuracy to the estimate.
18. Indicate if and where non-labor costs (e.g. PPE, shipping, taxes, insurance [NUREG 1757, Vol 3, Appendix A, pg A-28]) and field support items such as field trailers/portable toilets/computers/electricity/water etc. have been included in the estimate. If they have not been included, add line items for these costs.

Mixed Waste RAI:

Has mixed waste ever been present on the SMC site? If mixed waste is still onsite, how will it be dispositioned? If mixed waste was formerly on the SMC site, how was it dispositioned? Has SMC sampled to determine the occurrence of mixed waste on the surface and in the subsurface? If no sampling has been performed, how will SMC demonstrate that mixed waste are not present? Is there chemically contaminated equipment being considered for consolidation under the engineered barrier thus creating the potential for mixed waste? Demonstrate through either process knowledge, historic operating practices, or from sample analysis whether mixed waste is present onsite. This discussion should address the likelihood of mixed waste in the storage yard as well as in underground structures and systems such as septic systems, drains, pipes, and discharge lines.

February 17, 2009

Mr. David R. Smith
Radiation Safety Officer
Shieldalloy Metallurgical Corporation
35 S. W. Boulevard, P. O. Box 768
Newfield, NJ 08344-0768

SUBJECT: TRANSMITAL OF REQUESTS FOR ADDITIONAL INFORMATION INVOLVING ENGINEERED BARRIER DESIGN, MIXED WASTE AND ALARA ISSUES AT SHIELDALLOY'S NEWFIELD, NJ FACILITY (Docket No.: 40-7102, License No.: SMB-743)

Dear Mr. Smith:

I am transmitting to you three enclosures. Each contains Requests for Additional Information (RAIs) involving the U.S. Nuclear Regulatory Commission (NRC) staff's review of the Shieldalloy Metallurgical Corporation's (SMC) "Decommissioning Plan for the Newfield Facility" (Report No. 94005/G-28247) and associated documents. Enclosure 1 is an RAI concerning the issue of mixed waste. Enclosure 2 involves RAIs concerning Shieldalloy's as Low as Reasonably Achievable (ALARA) evaluation and Shieldalloy's criteria for releasing contaminated material and equipment from the site. Enclosure 3 involves RAIs associated with Shieldalloy's Engineered Barrier Design Report which you transmitted to me in a letter dated August 21, 2008.

Your August 21, 2008, letter had indicated that the Engineered Barrier Design Report was to be considered as an interim draft and that once the staff's comments on the draft were resolved; the final version of the document would be issued and become a part of Rev 1b of the DP. However, your October 20, 2008, email requested that, based upon the staff's quick review of the report, that an in-depth review be performed. The staff has performed that in-depth review and the RAIs are a result of that review. Enclosure 3 reflects discussions between your organization and consultants and the NRC staff on the draft RAIs which occurred during the November 19, 2008, public meeting at your Newfield facility. Enclosures 1 and 2 reflect similar discussions on the draft RAIs which occurred during the November 20, 2008, public meeting at the Newfield facility.

Please provide a response to these RAIs within 30 days of the date of this letter. If SMC is unable to provide the information by that date, please contact John Hayes using the contact information below and provide a revised submittal date at that time.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC;s document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.

If you have any other question concerning this letter or its enclosures, please contact Mr. John Hayes, Senior Project Manager, Materials Decommissioning Branch by telephone at (301) 415-5928, or by e-mail at john.hayes@nrc.gov.

Sincerely,

/RA/

Rebecca Tadesse, Chief
Materials Decommissioning Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-7102
License No.: SMB-743

cc: Shieldalloy Distribution List

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If you have any other question concerning this letter or its enclosures, please contact Mr. John Hayes, Senior Project Manager, Materials Decommissioning Branch by telephone at (301) 415-5928, or by e-mail at john.hayes@nrc.gov.

Sincerely,

/RA/

Rebecca Tadesse, Chief
Materials Decommissioning Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-7102
License No.: SMB-743

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MIXED WASTE REQUEST FOR ADDITIONAL INFORMATION

Shieldalloy Metallurgical Corporation (SMC) should address how they have identified the presence or absence of mixed waste presently or formerly and how it was or will be disposition if it was or is present at the Shieldalloy site.

Basis:

The steelmaking process at the Shieldalloy site involved the use of many chemicals. These chemicals were utilized in the process and in the production of the end product. One chemical which was utilized was chromium which has been deemed by the U.S. Environmental Protection Agency (EPA) to be a hazardous waste. Another chemical element, beryllium, was known to be onsite. An obvious question is whether any hazardous waste has been mixed with the radiological material such that there has been, at any time, mixed waste as defined by EPA, onsite. During a site visit, it was indicated that the coloration of certain slags was attributed to the presence of trace amounts of chromium. Therefore, there exists the potential for mixed waste to be present onsite.

Path Forward:

SMC should:

a) Identify what hazardous wastes have been determined to be present onsite at the Shieldalloy facility;
b) Identify the sampling and analysis and other actions SMC has taken to identify the absence or presence of mixed waste in pipe and drain lines, septic fields, surface and sub-soil surfaces, slag, baghouse dust, equipment and other facility buildings, structures, components, and process byproducts;
c) Indicate whether mixed waste is currently present onsite and, if so, where is it located;
d) Indicate how the mixed waste will be and/or was disposed; and
e) Indicate whether the radioactive material under the engineered barrier cover could include both hazardous waste and radioactive waste.

Enclosure 1

As Low as Reasonably Achievable Evaluation (ALARA) and Shieldalloy's Critiera for ReleasingContaminated Material and Equipment

1. For the ALARA Evaluation for Restricted Use, Provide Discussion of Need for Radon Mitigation Techniques as Part of Institutional Controls

Basis:
Chapter 5 (with associated Tables) of the Decommissioning Plan (DP) indicates that SMC eliminated the radon pathway from all exposure scenarios evaluated. Justification is provided in Section 5.3.2.1 and Table 17.4 of the DP (Rev. 1). In Section 5.3.2.1, SMC states that, in the Statements of Consideration (SOC) for the License Termination Rule (LTR), the NRC staff documented concurrence with eliminating the radon pathway for outdoor exposure scenarios. The SOC was published in the *Federal Register* (FR) (at 62FR39057, dated July 21, 1997). SMC quotes part of a passage from Section F.6.3 of the SOC, which discusses comments on the proposed rule and how radon is to be addressed under the final rule. However, what SMC quoted neglected key parts of the Section F.6.3 discussion in the SOC. The following is the complete conclusion of Section F.6.3 of the SOC, starting with the last sentence SMC had quoted (emphasis added below by U.S. Nuclear Regulatory Commission (NRC) staff).

> Therefore, in implementing the final rule, licensees will not be expected to demonstrate that radon from licensed activities is indistinguishable from background on a site-specific basis. Instead this may be considered to have been demonstrated on a generic basis when radium, the principal precursor to radon, meets the requirements for unrestricted release, without including doses from the radon pathway.
>
> In some instances it may not be reasonable to achieve levels of residual concentrations of radon precursors within the limit for unrestricted use. As discussed in Section IV.B for cases such as these, restricting site use by use of institutional controls could be considered by a licensee as a means to limit the doses from precursors by limiting access to the site. Under the restricted use provisions of the rule, these doses are required to be further reduced based on ALARA principles. In developing guidance on the application of ALARA in such cases, the Commission will also consider the practicality of requiring as part of controls the use of radon mitigation techniques in existing or future structures.

The NRC staff disagrees with SMC's statement that NRC had concurred on elimination of the radon pathway for outdoor scenarios. The point made in the SOC was that the radon pathway did not need to be addressed for sites otherwise meeting the *unrestricted use* criterion (of 10 CFR 20.1402). SMC has proposed license termination for the Shieldalloy site under both unrestricted and *restricted use* provisions. The NRC staff has concluded that SMC's understanding of the SOC regarding the radon pathway for the SMC site is incorrect.

However, based on the SOC discussed above, the NRC staff believes that the radon pathway *does not* need to be included *in the dose assessments* (for compliance with the numerical criteria for unrestricted use or restricted use termination) for the SMC facility. Instead, the NRC staff believes that the radon pathway only needs to be addressed as part of the ALARA

evaluation. Specifically, the NRC staff believes that the ALARA evaluation for compliance with §20.1403(a) (restricted use) should consider the practicality of radon mitigation techniques in structures as part of the institutional controls proposed for the site.

Path Forward:
In its ALARA evaluation for compliance with §20.1403(a), SMC should include consideration of the need for and practicality of radon mitigation techniques in structures as part of the institutional controls proposed for the site.

2. Provide ALARA Evaluation for Unrestricted-Use Portion of the Site

Basis:
The proposed approach to decommission the SMC site includes cleanup of a portion of the site for release from the license for unrestricted use. The LTR criteria for unrestricted use termination, in 10 CFR 20.1402, includes that the residual radioactivity has been reduced to levels that are ALARA. Chapter 7 of the DP discusses the ALARA evaluation that SMC performed. The discussion in Chapter 7 focuses on the evaluation for the proposed restricted use portion of the site and does not include discussion of an ALARA evaluation for the unrestricted portion of the site.

Path Forward:

Provide an ALARA evaluation for the unrestricted-use portion of the proposed site decommissioning, to show how SMC plans to comply with the ALARA provision of §20.1402. NRC staff guidance on ALARA for license termination criteria is provided in Chapter 6 and Appendix N of NUREG-1757, Vol. 2, Rev. 1.

3. For the ALARA Evaluation for the Eligibility Criteria of 10 CFR 20.1403(a): Provide Additional Quantification or Details on Regulatory Costs

Basis:

The DP (Rev. 1), in Section 7.3.7, provides a brief discussion of regulatory costs that relate to the ALARA evaluation for the restricted use requirements of 10 CFR 20.1403(a). However, SMC has not quantified any of the regulatory costs. The NRC staff believes that Information should be available with which SMC could estimate these regulatory costs. Because the regulatory costs can be significant, and could vary considerably between the decommissioning options being evaluated, quantifying these costs could be important to the overall ALARA evaluation.

Path Forward:

Provide additional quantification of the regulatory costs for the different decommissioning options being evaluated as part of the ALARA evaluation for the eligibility criteria of §20.1403(a).

4. Justification for Excluding Radon Pathway from Dose Assessment is Technically Incorrect.

Basis:
In Table 17.4 of the DP, SMC provides an argument for excluding the radon pathway (in addition to the argument based on the Statements of Consideration for the LTR, discussed in a previous RAI 1 above). In the Table, it was stated: "In addition, the source term found is not a significant producer of radon due to the relatively long half-life of the thorium isotopes found in the slag." The fact that the source term includes long half-life isotopes does *not* preclude radon from being produced or being a contributor to dose. In fact, the long half life of the thorium isotopes (along with the relatively short half life of the radon isotopes) means that radon will be produced for a long time. Therefore, the argument proposed in Table 17.4 is not justified.

Path Forward:
In its revision to the DP, SMC should correct this technical inaccuracy. See also the related Request for Additional Information (RAI) 1 above regarding ALARA and the radon pathway.

5. Provide Details of the Determination of Dose from Current Radon Releases

Basis:

In the ALARA analysis of the DP (Rev. 1), Section 7.2.1.2 describes estimates of current doses to members of the public around the SMC site. This section states that a nominal dose rate from radon emanation from baghouse dust is approximately 8.2×10^{-3} microR per hour. The DP does not describe how this value was determined though there is reference to a quarterly monitoring report.

In SMC's response to previous RAIs dated April 24, 2007 documentation was provided about radon flux measurements from the baghouse dust pile (Response Attachment 4a, ML071170521) and calculated radon emissions from the slag piles (Response Attachment 4f, ML070520145). The first of these documents only addressed emissions from the baghouse dust pile. The second document entitled, *Radiation Dose Estimates from Atmospheric Emissions from the Newfield Facility*, describes the calculations of emissions of Rn-222 from the slag piles on pages 9 and 10 of the report. The NRC staff checked these calculations and believes there is an error in the calculation. This error results in an underestimate of the annual Rn-222 release rate by a factor of more than seven orders of magnitude. This error could make a significant change in the calculated doses.

The NRC staff notes that a July 3, 2008 SMC reply to the Commission regarding an ASLB memorandum described a recent SMC dose assessment for members of the public. In this reply, SMC cited a report by Integrated Environmental Management, Inc, "Prospective Dose Assessment for members of the Public," dated May 21, 2008. The NRC staff has reviewed this report, but this report does not address doses from potential radon releases.

Path Forward:
Reevaluate the estimates of Rn-222 emissions from the slag piles and revise the emission estimates and dose calculations if appropriate. If no revisions are made, provide additional justification for the emission estimates and dose calculations.

6. Provide Justification for Criteria for Release of Materials and Equipment

Basis:

In a July 5, 2007, NRC letter to SMC, RAI 59 requested information about SMC's proposed criteria for releasing volumetrically contaminated materials and equipment because the SMC DP included criteria that were applicable only to surface-contaminated materials and equipment. In SMC's November 9, 2007, response, SMC proposed to use criteria from **ANSI/HPS** N13.12-1999, "Surface and Volume Radioactivity Standards for Clearance," for surface-contaminated and for volumetrically contaminated materials and equipment.

The NRC staff has not endorsed or generically approved use of this ANSI/HPS standard for clearance of materials and equipment. The NRC staff's current guidance on criteria for release of contaminated materials and equipment is contained in Section 15.11 of NUREG-1757, "Consolidated Decommissioning Guidance," Volume 1, Revision 2. Because the ANSI/HPS standard has not been endorsed by the NRC staff, the guidance for case-by-case evaluations of clearance criteria, as described in Section 15.11, should be followed. For volumetrically contaminated material, this includes following the approach of 10 CFR 20.2002, using a criterion of a few milirem (mrem) per year. This same approach could be used for surfice contaminated material as well.

The NRC staff understands, from phone conference calls with SMC, that concrete may be the material for which the volumetrically contaminated criteria may need to apply. NUREG-1640 provides descriptions of dose assessments for unrestricted release of concrete. SMC might wish to review the information in NUREG-1640 as a possible resource for developing release criteria for volumetrically contaminated materials consistent with the guidance of NUREG-1757.

Path Forward:

Provide justification for the criteria to be used for release of surface-contaminated and volumetrically contaminated materials and equipment. If SMC proposes use of the criteria in ANSI/HPS N13.12 or other criteria not previously approved by NRC staff, SMC should provide independent justification, including a dose assessment, following the guidance in Section 15.11 of NUREG-1757, Vol.1, Rev. 2, and the approach of 10 CFR 20.2002.

SHIELDALLOY
REQUESTS FOR ADDITIONAL INFORMATION
SMC ENGINEERED BARRIER DESIGN DOCUMENT

General

1. **Avoid using the term "prevent" infiltration when describing the purpose of the engineered barrier or its components.**

Basis:

Many places in Section 8.3 and the Appendices use the term "prevent" in discussions of the purpose of the engineered barrier or its components. For example, on page 5, the clay barrier layer discussion states that "The clay barrier layer has been designed to prevent precipitation that percolates through the upper layers of the engineered barrier from infiltrating into the underlying consolidated materials." This use of the term "prevent" is misleading and likely unsupportable. The term prevent can give the unrealistic expectation that the clay barrier would preclude infiltration, rather than reduce to some acceptable amount together with other components. Some parts of the text use of more accurate term "inhibit" (e.g., Appendix B, p. B-12, para. 2)

Path Forward:

Consider using a more realistic term such as "reduce", "inhibit", or "minimize" wherever the term "prevent" has been used in the text and appendices.

2. **Geotechnical Characterization of Site and Borrow Materials: There is no geotechnical site subsurface or borrow material (other than rock) characterization provided with the engineered barrier design documentation.**

Basis:

All geotechnical analyses seem to have been performed based on assumptions only (see RAIs 41, 42, and 43). In order to acceptably perform geotechnical analyses related to potential degradation mechanisms, there need to be soil borings, test pits, sample testing, etc. to provide the basis for material characteristics. The NRC staff recognizes that the **QA/QC** Construction Plan includes statements on testing borrow source materials prior to placement. This also should be discussed in Section 8.3.1.

Path forward:

SMC needs to conduct and provide the results of a geotechnical subsurface characterization program. As an alternative to providing a new subsurface investigation, SMC could provide information from previous subsurface investigations in the immediate area of the proposed disposal cell. As an alternative to an immediate identification and assessment of borrow materials, SMC has indicated in its QA/QC Construction Plan that it will test and report on borrow material characteristics prior to their placement. However, SMC should include a statement up front in Section 8.3.1 that it will test borrow materials once the borrow sources are

identified, and provide appropriate test results to demonstrate that conservative assumptions were used in the geotechnical analyses and material specifications will be met.

3. Conduct radiological characterization of soils during construction of the engineered barrier when existing piles of slag and baghouse dust are removed from their current location to the engineered barrier footprint.

Basis:

Shieldalloy has collected soil samples under the edges of some of the existing slag and baghouse piles to determine if there is evidence of leaching of radionuclides over the past few decades and movement into the soil beneath the piles. Due to size of the existing piles, sampling directly beneath the large piles could not be done. However, construction of the engineered barrier would result in relocation of some slag and baghouse dust material. When some of the piles of slag and baghouse dust are moved to the engineered barrier footprint, the soils beneath these moved piles would become accessible for sampling at depth and analysis for radionuclides. These tests would provide additional data regarding the absence or presence of radionuclides that could have been leached from the piles over the past decades of exposure to weathering processes.

Path Forward:

Shieldalloy should propose plans for sampling the soils under the slag and baghouse dust piles after they have been moved, but before the underlying soil/slag mixed layer is removed to the established derived concentration guideline level (DCGL). The purpose of this subsurface sampling would be to obtain a vertical profile of samples of the soil/slag mixed layer and underlying undisturbed soil layers to confirm results of samples previously taken in the subsurface under the edges of piles.

Section 8.3

4. The discussion on page 2 regarding development of the design for the engineered barrier incorrectly references NRC's regulation in 10 CFR Part 61.52.

Basis:

The NRC regulation for low level waste disposal facilities under 10 CFR Part 61.52 does not apply to the decommissioning of the Shieldalloy site.

Path Forward:

Remove the reference to 10 CFR Part 61.52 and reference the NRC decommissioning requirements for restricted use in License Termination Rule in 10 CFR 20.1403, along with the supporting guidance in NUREG-1757, Vol 2, Rev. 1, Section 3.5 on Use of Engineered Barriers.

5. The risk-informed, graded approach used in the development of a robust engineered barrier design is not explained.

Basis:

It is noted on page 2 that a risk-informed, graded approach was used in the development of a robust engineered barrier design. A discussion is missing of how the risk informed, graded approach was used by Shieldalloy for developing the design, determining the individual barriers and their functions, and providing a technical basis for the design that is based on compliance with 10 CFR 20.1403 of the license termination rule (LTR). For example, on page 3 there is a list of specific considerations that are deemed applicable to the SMC site such as providing shielding and severely limiting infiltration. These considerations could be discussed within the context of reducing risk and contributing to compliance with the dose criteria by describing the source term and related exposure pathways these barriers are designed to mitigate.

Such a discussion would provide a clearer understanding of how long-term protection would be provided and how the design contributes to compliance. It also would provide an understanding along with dose assessments and sensitivity analyses of how each component of the engineered barrier system contributes and which components are relied on for compliance.

Path Forward:

NUREG-1757 vol. 2, Rev. 1, Section 3.5 discusses the use of a risk-formed graded approach for developing the design of engineered barriers under NRC's License Termination Rule in 10 CFR 20 Subpart E. A discussion of how the risk-informed approach was used to develop the design so that it contributes to compliance with both the 25 and 100 mrem/yr dose criteria of the LTR should be provided. Also describe how the approach was graded so that more robust components of the design were incorporated in order to address the need for long-term protection for the long-lived radionuclides. For example, the design approach of the erosion protection layer used the NRC guidance in NUREG-1623 for designing the rock cover based on the **PMP and PMF** to provide a more robust and passive design that would not rely on active ongoing maintenance.

6. The boundary for the restricted use area shown on Figure 18.6 is incorrect.

Basis:

Figure 18.6 referenced on page 4 shows the new footprint of the engineered barrier falling outside of the restricted use area boundary.

Path Forward:

Revise Figure 18.6 by changing the restricted use area boundary that incorporates the new footprint of the engineered barrier or change the footprint. The revised boundary should also consider the long-term monitoring plans when revised to include the location of future groundwater monitoring wells and the need to maintain controls on these wells.

7. The discussion on page 4 states that the thickness of the engineered barrier layer was selected so that exposure would be less than 100 mrem/yr even if no barrier maintenance takes place. This statement is unclear and incomplete.

Basis:

It is unclear if the statement on page 4 "so that exposure would be less than 100 mrem/yr even if no barrier maintenance takes place."…is the same as the100 mrem/yr LTR dose criterion assuming failure of institutional controls.

The statement on page 4 is also incomplete because the reference to 100 mrem/yr also gives the impression that this is the only dose criterion that the engineered barrier contributes to because there is no discussion that the engineered barrier system performance must also meet the restricted use 25 mrem/yr dose criterion for when institutional control are in effect. For example, the shielding layer is critical to reducing direct exposures so that the 25 mrem/yr dose criterion can be met. Thus, the discussion does not explain that the engineered barrier system and all of its components should be designed as appropriate to contribute to compliance with both the 25 and 100 mrem/yr dose criteria.

Path Forward:

Explain that both the 25 mrem/yr and 100 mrem/yr LTR dose criteria are applicable to the engineered barrier design and how the design was developed to contribute to compliance with the applicable dose criteria. This is fundamental to the risk-informed approach.

8. It was noted on page 2 that a risk-informed approach was used for the engineered barrier design; however, the amount of reliance that would be placed on the engineered barrier toward compliance was not discussed.

Basis:

The August 21, 2008, transmittal letter for the engineered barrier report stated in the second paragraph that SMC believes that there is no evidence of slag leaching and that the engineered barrier design will add a further layer of protection to the underlying ground water quality. It is not entirely clear from this statement how much the engineered barrier overall is being relied on for meeting the dose criteria or if SMC believes that compliance can be achieved solely by the low leachability of the slag and baghouse dust. In other words, it is unclear if the engineered barrier performance is in addition to the slag performance or is allocations of performance needed from both to achieve compliance. Is the performance allocation 100 percent for the slag and 0 percent for the engineered barrier or would both the slag and engineered barrier contribute? For the first case, the engineered barrier could be considered another layer of protection, or a redundancy.

Path Forward:

After the results of the leach rate tests are available, explain how performance of the source term and overall engineered barrier is allocated for compliance with both the 25 and 100

mrem/yr dose criteria and for both the direct exposure and groundwater exposure pathways. In other words, do a sensitivity analysis with and without the engineered barrier.

9. This section identifies and discusses the Final Status Survey and the Long-Term Control Plan. A discussion of a Construction Completion Report should also be included here similar to how it is discussed in Section 4.3 of Appendix C and that it would need to be eventually prepared to document all construction activities, including co-location of contaminated materials and how the cover, was constructed.

Basis:

For decommissioning a site with the use of an engineered barrier, the NRC would need a Construction Completion Report that documents how the entire engineered barrier, including contaminated materials and cover, was actually constructed. Although a Construction Completion Report is not specifically mentioned in the LTR or in NUREG-1757, this approach has been used in NRC's Uranium Recovery Program and has recently been adapted and used at one decommissioning site under the LTR, the Cabot site in Reading, Pennsylvania. Appendix C identifies the need for such a report, but it is not identified or described in Section 8.3.

Path Forward:

A new section before Section 8.3.4 on Final Status Survey should be added to commit to developing a Construction Completion Report and submitting it to NRC together with the Final Status Survey Report and the Long Term Control Plan after completing decommissioning activities. The Completion Report for the Cabot site should be used as a recent example and has already been provided to Shieldalloy. It is noted that this example, is simpler than expected for the Shieldalloy engineered barrier because the Cabot engineered barrier was only designed for erosion protection and did not have the other barrier components that are being proposed for the Shieldalloy engineered barrier. Furthermore, the Completion Report should address construction of the entire engineered barrier including co-location and placement of contaminated materials and cover layers. For SMC consideration, an example Completion Report contents is given below that is based on similar reports that have been submitted to NRC by uranium mill tailings licensees as well as the decommissioning of the Cabot site.

<u>Example of Completion Report Contents</u>

1. Introduction
2. Site History and Background Information
3. Overview of Construction Activities and Associated Quality Control Testing
4. Completed Site Cleanup Decommissioning Activities
5. Contaminated Material Co-Location Activities and Test Results
6. Clay Barrier Placement and Test Results
7. Biointrusion/Drainage layer Placement and Test Results
8. Geotextiles Placement and Test Results
9. Cover soil Layer Placement and Test Results
10. Bedding Layer Placement and Test Results
11. Erosion Control Layer Placement and Test Results

12. Other Decommissioning Activities
13. Summary and Conclusions
14. References

10. Cleanup goals should be developed and used as the basis for removal of contaminated surface soils adjacent to the engineered barrier footprint.

Basis:

Section 8.3.2 on page 9, paragraph 1 states that "As part of the consolidation process, surface soil screening for radiological constituents will be performed within the Storage yard to ensure soils outside of the footprint of the engineered barrier are not impacted." This statement is inconsistent with the third paragraph that states: "…those areas that are above the applicable DCGL will be placed onto the consolidated pile." Not impacted implies lack of any radiological contamination from facility operations, while removal of soil above the DCGL implies removal to the specific level. Also, the applicable DCGL is not identified in this Section or another referenced chapter/section of the DP.

Path Forward:

Resolve the inconsistency in discussions as identified above and provide the applicable DCGL or reference where it would be provided in the DP.

11. Need to clarify the design consideration on minimizing handling to lower costs. (Page 4; 3rd Bullet from top)

Basis:

This item in the list of design considerations indicates a goal to minimize the need for handling materials to lower construction costs. Since the need for a design that meets the dose requirements is primary, this factor should include a caveat that minimizing handling to lower costs is only a consideration when there is no impact on the overall stability of the storage system.

Path forward:

SMC should indicate that the goal to minimize the need for handling materials to lower construction costs is only a consideration when there is no impact on the overall stability of the storage system.

12. Cover Soil Layer: A description of the make-up of this material (soil type, gradation requirements, etc), as has been included for the other engineered barrier layers, is absent from this section. (Page 6; 2nd Bullet)

Basis:

Although a description of the make-up of this material can be found elsewhere in the specifications section of this documentation, a brief description in this section will provide consistency with the discussions for the other barrier layers.

Path forward:

SMC should add a description of the cover soil layer material requirements to this section.

13. **The proposed process for co-locating, handling, and placing all of the contaminated material may have a high possibility for incomplete filling of voids, subsequent movement of fines into the voids with time, and resulting differential settlement/slumping on the surface of the engineered barrier. (Page 7; Section 8.3.2 and Drawing D-1)**

Basis:

This section includes a discussion of the process for co-locating, handling, and placing all of the contaminated material. The approach calls for initial placement of the largest slag, overlain by intermediate sized slag, overlain by the fine material, "…filling in voids where possible." As described, this method would have a high possibility for incomplete filling of voids, subsequent movement of fines into the voids with time, and resulting differential settlement/slumping on the surface of the engineered barrier. In addition, observations of the stockpiled contaminated materials revealed that there are some trash materials that will be susceptible to relatively fast decomposition. The specifications should address this.

Path forward:

SMC needs to provide discussion of the detailed methods that would be used to ensure all voids are filled. In addition, SMC needs to provide information on the basis for selection of this approach in lieu of crushing and/or mixing the contaminated materials to form a uniform mixture that could be compacted to form a completely stable base for the engineered barrier. As an alternative, SMC could provide a different process for co-locating the contaminated materials. In addition, SMC needs to include in the construction specifications a requirement for ensuring that decomposable trash materials are uniformly spread throughout the cell to avoid creation of large voids upon decomposition.

Appendix A (Earthwork Specifications)

14. **This section (and other places throughout the documentation) repeats the proposed questionable process for placement of contaminated materials. (Section 02220-7; Part 3.2.1)**

Basis:

See RAI 13 on contaminated material placement

Path forward:

SMC should consider possible revisions to the proposed process described in various sections throughout the documentation in accordance with the response to RAI 13.

15. Complications may occur when using nuclear gauges on radioactive materials. (Section 02220-9; Part 3.5.2)

Basis:

This section addresses compaction of NRC-licensed material, and testing of density and moisture content with a nuclear gauge. Complications may occur when using nuclear gauges on radioactive materials. Nuclear gauge manufacturing representatives have indicated that for radioactively contaminated materials, care should be taken to calibrate the equipment by using the standard count both offsite and onsite to compare readings, and if necessary to supplement nuclear gauge testing with sand cone testing.

Path forward:

SMC should commit to pre-compaction standard count testing to ensure the nuclear gauge will work effectively in the contaminated material environment, and to enable accurate calibration of the equipment.

16. Contrary to the statement in this section that "The following test frequencies shall be consistent with paragraph 1.4.1, Part B…" they are not. (Section 02227-8; Part 3.2.2)

Basis:
To be consistent with paragraph 1.4.1, the line items for compaction, Atterberg Limits, and conductivity in the Section 3.2.2 table should specify "once for every 5000 cubic yards" rather than "Initial test (one time)."

Path forward:
SMC needs to correct this inconsistency.

17. More information is needed to properly define the riprap gradations. (Section 02228)

Basis:

Detailed gradations showing the complete gradation bands and the minimum D_{50} for each layer thickness and rock size are needed for the NRC staff to complete its review. It should be emphasized that the required D_{50} to resist erosion should represent the minimum D_{50} of the rock gradation. Guidance for providing more detailed gradations may be found in NUREG-1623, Appendix F.

Path Forward:

SMC should revise the gradations to be used for each layer thickness, provide the gradation bands, and specify the minimum D_{50} values.

18. The quality assurance requirements in Sections 02228 and 02225 for the radiological characteristics of the diabase angular stone for erosion protection and the clay barrier are inconsistent and the technical basis is not clear.

Basis:

On page 2, Section 1.3.1 B. 1, indicates radiological test results for the diabase rock shall be in conformance with Table B.1 of NUREG-1757. However, Table B.2 of NUREG-1757, vol. 1, seems more appropriate because this table contains uranium and thorium, which are found in the diabase as identified on page 7 of Appendix B, Attachment 2. However, Table B.2 values are NRC's screening values for meeting 25 mrem/yr and, as such, may not be appropriate levels for bringing materials onsite from offsite sources. This Table B.2 approach also appears inconsistent with page 4, Part 2 A.3. that indicates that the diabase rock should be below the background radioactive level. Furthermore, the background level is not given. Similar requirements for the clay barrier in Section 02225, page 6 states that source material (uranium and thorium) shall not exceed 50 ppm. No basis is given here for the 50 ppm value for the clay and it is not clear why a different requirement is given for the rock and the clay. Appendix B, Attachment 2, p. 7 states that the diabase rock has a total uranium and thorium activity of about 1.2 pCi/g. It is not clear how this low activity level compares to stated requirements (background, Table B.2, or 50 ppm).

Path Forward:

Resolve the inconsistencies in the radiological requirements for the clay and the rock discussed above and provide a technical basis for the value(s) selected. Consider using background as the specification for both clay and rock. If site background is not used provide a basis for the selected value and describe how a value greater than background would be considered in the dose assessment.

19. Clarify the timing of durability test results and acceptance/rejection of rock during production.

Basis:

Section 3.3.1 on page 8 indicates that durability test results would be used for acceptance or rejection of the rock. Appendix C, p 3-7 also states that testing will be done "prior to delivery and during placement". Production experience at other sites indicates that durability test results will take time to conduct and analyze before a decision about acceptance or rejection of the rock can be made. Because there would be a small amount of rock and a short time needed for placement, the rock could be prematurely placed on the engineered barrier before the analyses are completed and an acceptance decision made.

Path Forward:

It should be noted in the Section 3.3.1, Appendix C, and appropriate procedures that rock production and placement schedules would account for the rock durability testing time in order to avoid placing rock on the engineered barrier before it is accepted.

20. (Appendix B, Attachment 1) Additional information and analyses are needed to justify the design of the perimeter drainage channels.

Basis:

Staff notes that the method used to size the riprap for the perimeter drainage channels was the Connecticut Department of Transportation (CTDOT) method. Based on a check of the rock sizes using this method, the staff considers that the rock sizes may be too small, when compared with some other methods.

Path Forward:

Since NUREG-1623 provides acceptable methods for rock sizing, SMC should check the **CTDOT** riprap sizing method used and compare the results with NUREG-1623 methods. If necessary, the rock sizes should be revised.

21. Additional information and analyses are needed to justify the design of the perimeter drainage channels, with regard to potential large increases in shear stresses on the outside of the bends of the channels. (Attachment 1)

Basis:

The perimeter drainage channels are designed to convey flows around the disposal cell. With the large amount of channel curvature proposed, the riprap design needs to include an allowance for increased shear stresses on outside of these bends. Guidance for determining increased shear stresses and rock sizes on the outside of bends may be found in NUREG-1623.

Path Forward:

SMC should either modify the channel rock sizes at those locations where curvature occurs or should justify that the currently-proposed design is adequate.

22. Additional information and analyses are needed to justify the actual ability to construct a rock-lined channel with a very small bottom width. (Attachment 1)

Basis:

SMC proposes to construct trapezoidal perimeter drainage channels with a bottom width of two feet. Based on staff experience with the construction of rock-lined channels, it appears that it may be difficult to construct a channel with such a small bottom width, especially since the rock sizes may be larger than 12-18 inches.

Path Forward:

SMC should provide further discussion regarding their procedures for constructing the channel. SMC should also evaluate the possibility that it may be difficult to meet placement specifications and re-design the channel, if necessary.

23. Additional information and analyses are needed to justify the design of the aprons for the outlets of the perimeter drainage channels. (Attachment 1)

Basis:

Staff review of the design of the riprap for the diversion channel outlet aprons indicates that the rock size, rock volume, and overall design may not be adequate to prevent erosion, head-cutting, and gully intrusion. It is not clear that adequate consideration has been given to flow distribution across the aprons and the localized flow concentrations and flow velocities produced at the channel outlets onto the apron. Guidance for the design of aprons and channel outlets may be found in NUREG-1623.

Path Forward:

SMC should provide additional information and calculations to demonstrate how the aprons were designed. The revised calculations and design should provide: the design velocities for the riprap of the apron; the minimum flare angle (based on the velocity) of the apron as it increases in width in a downstream direction; velocities and possible scour depths at the downstream end of the aprons; and rock sizes for the apron and the toe of the apron. Additionally, SMC should provide detailed drawings of aprons. These detailed drawings should show the aprons, with particular emphasis on their location and the manner in which the diversion channel transitions from a trapezoidal channel to a horizontal rock apron.

24. The staff notes that the storm water detention area south of the disposal cell is designed for a 100-year flood event, which may not be sufficient to prevent erosion and flooding of the cell. (Attachment 1)

Basis:

It is not clear how a Probable Maximum Flood (PMF) event would affect this area and, in particular, how the detention area design will affect the design of the disposal cell. For example, the PMF could erode and damage the culvert and/or form a large gully or a preferred flow path.

Path Forward:

SMC should provide further analyses of the effects of a PMF and how the disposal cell design may be impacted by such an event.

25. A technical basis is not given for the thickness of the cover for shielding purposes.

Basis:

Appendix B provides a technical basis discussion for each of the engineered barrier components/layers, but does not discuss shielding and the basis for determining the appropriate thickness of the cover to limit direct exposure and comply with both the 25 mrem/yr and 100/500 mrem/yr. dose criteria.

Path Forward:

Add a discussion that provides the technical basis for the components of the engineered barrier that are intended to provide shielding of direct exposure or summarize here and reference the appropriate chapter of the DP where the basis is given.

26. Revise the reference to meeting radon release limits.

Basis:

Section 1.1 on page B-1 references performance objectives from NUREG-1623, including item #4, specifically for "meeting radon release limits." The manner in which this performance objective is worded on page B-1, it could be inferred that the erosion barrier itself is designed to meet radon release limits. This is not the case. Instead the discussion in NUREG-1623 on page 7-8 means that erosion protection is needed to prevent gullies in the radon barrier that could expose uranium mill tailings and result in higher radon releases.

Path Forward:

Reword item 4) as follows: "preventing exposure of tailings by erosion and resulting higher radon releases."

27. Add a discussion of how a design based on the PMP and PMF conditions also reduces the need for future long-term maintenance.

Basis:

Section 1.1 on page B-1, paragraph 2 indicates that "By designing to protect against erosion under PMP and PMF conditions, protection will also be provided under less severe, more common storm events." While correct, further discussion is needed of how this design approach would minimize future long-term maintenance.

Path Forward:

Add a discussion of how the PMP and PMF design approach would also minimize future maintenance. See NUREG-1623 for discussions of various approaches.

28. Provide a technical basis for the moisture monitoring and irrigating approach and 10-year time period proposed for maintaining the moisture content of the clay layer. Discuss the potential for changes in hydraulic properties at deeper depths over long periods of time and without monitoring and maintenance (irrigation) that might be able to maintain moisture levels and minimize desiccation cracking at depth.

Basis:

In Section 1.2.2, page B-5 the depth of the clay layer is stated as sufficient to limit desiccation and that sufficient silt and clay in the cover soil would maximize moisture retention. Also, in-situ

soil monitoring sensors are proposed to monitor soil moisture content of the clay barrier for 10 years and irrigation could be used to maintain acceptable moisture content of the clay layer. No references are provided as a technical basis that this approach has been demonstrated to be effective either in the short term or long term. Furthermore, no discussion is given for how the proper amount and timing of adding moisture by irrigation would be determined and how excessive irrigation would be avoided so that irrigation does not contribute to infiltration into the slag and baghouse dust.

Section 1.2 on page B-4 discusses recent ACAP studies regarding desiccation and hydraulic degradation. However, the references provided place much emphasis on short-term studies, such at the Monticello site with a design similar to SMC, that no percolation was reported over four years of monitoring. However, no discussion is provided about the uncertainty over decades or hundreds of years.

Path Forward:

SMC should include a discussion of what the determining factors are for setting the period for monitoring clay barrier moisture at 10 years, as opposed to a longer period. Provide a technical basis for using irrigation such as a reference to where this approach has been successfully used before. Also discuss how the amount and timing would be determined and excess irrigation avoided. Finally, discuss the long-term uncertainty associated with desiccation and hydraulic degradation.

29. Provide the contribution to total infiltration estimates from each component of the engineered barrier system, including ET, surface runoff, storage in the soil layer, runoff through the drainage layer, and infiltration through the clay layer.

Basis:

Section 1.7, pp. B-10 to 11 notes that the analysis "…conservatively neglects runoff associated with the surface layers of the engineered barrier, as well as absorption/storage in soil pores." The estimates discussed place greater emphasis on selected layers that have uncertainty in long-term performance, such as clogging of the drainage layer and degree of desiccation cracking of the clay layer. In contrast, surface runoff from the 3:1 slope of the engineered barrier should be considered a "layer" or another component of the engineered barrier system. This component might make a significant contribution to reducing infiltration even with the rock surface, but could be enhanced with a rock/soil/vegetation surface if needed. Furthermore, there may be less uncertainty about the performance of this component than with the clay layer component as well as its long term stability. In addition, long-term monitoring and maintenance would be simpler and less than that needed for other layers, such as the clay layer. While it appears to be conservative to neglect the surface component, it may be a component with many advantages and its contribution should be analyzed and its advantages and disadvantages discussed together with the other components.

Path Forward:

Based on infiltration analyses and dose modeling results (see RAIs 35 and 36), each component of the total engineered barrier system should be listed and its contribution to the

infiltration estimate and dose reduction should be given, both for as designed and degraded conditions. This would provide a clear summary of the calculations and dose modeling/sensitivity analyses for each component and provide a overview of how all the components are estimated to perform by reducing infiltration and contributing to compliance. Furthermore, this approach would allow alternative total infiltration values to be estimated by removing components that might be uncertain for some reason, such as questionable performance of the clay layer over the long term. Similarly, another component could be added or modified, such as using a rock/soil/vegetative erosion protection/ET surface component that would then have a higher estimate of surface runoff and ET than the rock-only erosion protection layer. For each of these alternative designs/systems for infiltration control, the resulting alternative total infiltration values could be used to calculate dose, thereby, estimating the contribution of the alternative engineered barrier systems on compliance with both the 25 and 100/500 mrem/yr dose criteria. Such an approach would be more risk-informed by providing risk insights from alternative designs and assumptions about degradation. The advantages and disadvantages of each component should also be discussed, both from a performance standpoint but also long-term monitoring and maintenance.

30. Revise the statement of purpose for durable rock.

Basis:

Attachment 2, p. 1 states that "The main purpose of selecting a durable rock material is to sustain the forces of weathering (known as rock durability) for a period of at least 1,000 years." Sustain is the incorrect term to use; instead, NRC guidance uses the term "withstand" the forces of weathering.

Path Forward:

Revise the term as suggested above.

31. Discuss the results of petrographic analyses that identified minor alteration of plagioclase feldspars to sericite, a mineral that is less durable than feldspar.

Basis:

The section on Absence of Adverse Minerals and Heterogeneities on p. 9 does not acknowledge or discuss the results of **PENNDOT** and SMC petrographic analyses that documented small amounts of sericite, a mineral that resulted from the alteration of feldspar and is less durable than feldspar. Also missing are the conclusions from the April 28, 2008, petrographic report prepare for SMC that the sericite alterations did not affect the overall integrity, density, and good quality of the rock.

Path Forward:

Add a discussion of the petrographic analyses conducted by PENNDOT and SMC that indentified small amounts of the secondary mineral sericite that resulted from the alteration of feldspars. Explain the origin of this secondary mineral, the small amounts observed, and conclusions regarding future rock durability. Include, the conclusion of the April 28, 2008,

petrographic report prepared for SMC that the sericitic alterations did not affect the overall integrity, density, and good quality of the rock.

32. Clarify and add a discussion of natural analogues more relevant to New Jersey.

Basis:

In the section on Direct and Indirect Evidence for Resistance to Weathering on p. 10-11, natural analogue rocks are discussed from climates different than New Jersey. Reconsider adding some of the diabase analogues from the Cabot information provided because they are the same or similar diabase in a similar climate (New York and Pennsylvania). While the erratics from the western US and Turkey might be of general use, they are in a more arid climate than New Jersey and that is why the New York/Central Park erratics would provide a stronger example from a similar climate. However, explain that the more arid examples are useful even though they are in arid climates because of the long time period they indicate (approx. 10,000 yrs) relative to the regulatory time period of 1000 years. Furthermore, the example from Turkey indicates that the striations withstood many years of exposure. An approximate time is needed because the term “many” is unclear.

Path Forward:

Revise as suggested above.

33. The potential use of irrigation or construction of permeable zones in the cover soil is not included in the evaluation of infiltration for RESRAD dose modeling. (Appendix B Section 1.2, page B-6, 1st paragraph)

Basis:

SMC states it may use irrigation or construct permeable zones in the cover soil to maintain acceptable soil moisture levels. SMC does not include the potential use of irrigation or construction of permeable zones in the cover soil in its evaluation of infiltration for RESRAD dose modeling found in Section 1.7 of this document. To-date SMC has not included the use of irrigation in its dose modeling evaluations in the DP. The use of irrigation or construction of permeable zones in the cover soil has the potential for increasing the infiltration rate.

Path forward:

SMC should include the potential use of irrigation or construction of permeable zones in the cover soil in its evaluation of infiltration for RESRAD dose modeling found in Section 1.7 of this document.

34. SMC uses potential evapotranspiration rather than actual evapotranspiration in its evaluation of infiltration and does not include a discussion of how evapotranspiration would change as the cover degrades. SMC did not include any discussion of how it determined the evapotranspiration coefficient that will be used in the RESRAD dose modeling. (Section 1.7, page B-10, 4th paragraph and Attachment 6, page 2, 2nd paragraph)

Basis:

SMC calculates infiltration (**I**) as precipitation ($\mathbf{P_r}$) minus evapotranspiration (**ET**) minus runoff ($\mathbf{Q_d}$). In applying this formula SMC uses a constant value for **ET** represented by the potential evapotranspiration rate. By using potential evapotranspiration rather than actual evapotranspiration SMC is overestimating the evapotranspiration and potentially underestimating infiltration. There are various environmental conditions that would cause actual ET to be less than potential ET. Additionally, there are factors related to the design of the engineered barrier that would cause actual ET to be less than potential ET. For example, the engineered barrier is not designed to include a vegetative cover, so there will be no transpiration from the cover, only evaporation, under the as-built state. In addition, SMC uses the same value for evapotranspiration under both the controls-in place and the controls-fail conditions. SMC does not discuss how degradation of the cover layers over time will impact evapotranspiration.

Appendix B, Section 1.7 and Attachment 6 identify the coefficient of evapotranspiration as one of the parameters required by the RESRAD dose modeling code for the calculation of infiltration. However, there is no discussion in either of these two sections of the Engineered Barrier Design document of the values or range of values that were calculated for this coefficient, or how these values will be incorporated into the dose modeling in RESRAD.

Path forward:

SMC should use the actual evapotranspiration in its infiltration analysis. The analysis should address the amount of evaporation or evapotranspiration that is estimated to occur from each component (layer) of the engineered barrier, particularly the cover soil and biointrusion/drainage layers. The estimate of actual evapotranspiration should consider how the individual layers of the barrier degrade over time under both the controls in-place and controls-fail conditions. SMC should justify the methods used to calculate actual evapotranspiration and the assumptions used in those calculations.

SMC should provide its method for determining the values of the evapotranspiration coefficient that will be used in the RESRAD dose modeling under the controls in-place and all controls-fail conditions. SMC should discuss how these values will be used in the RESRAD dose modeling. SMC should also perform a sensitivity analysis on this parameter in the dose analysis and provide justification for the range of values used for the parameter in the sensitivity analysis.

35. **SMC does not provide justification for determining the drainage from (flow through) the biointrusion/drainage layer using a method that is meant to describe runoff from a drainage basin. SMC does not provide adequate justification for the assumptions made when applying this method. SMC does not explain how the different runoff coefficients calculated for the 3 conditions of the clay barrier will be incorporated in to the RESRAD dose modeling. (Section 1.7, page B-11, 1st and 2nd paragraphs and Attachment 6, pages 3 and 4)**

Basis:

The method employed by SMC for calculating runoff at the clay barrier layer is typically used for calculating runoff from a small drainage basin during rainfall events and represents in part runoff over a surface. SMC applied this method to estimate runoff at the clay barrier surface which represents flow through a porous medium (in this case the biointrusion/drainage layer of the engineered barrier).

In its discussion of the determination of the value $\mathbf{c_1}$ for use in calculating the runoff coefficient ($\mathbf{C_r} = 1 - \mathbf{c_1} - \mathbf{c_2} - \mathbf{c_3}$), SMC states that the slope of the engineered barrier along the direction of flow is approximately 90% sloped at 33% (the length of the side slope) and 10% sloped at 4% (the length of the top slope). Measuring the lengths of the slopes on the drawings included with the barrier design document shows that the length of the 33% side slope would be approximately 60-65% of the total length in the direction of flow direction and the length of the 4% top slope would be approximately 35-40% of the total length in the direction of flow. Given that the length of the 4% slope is longer than SMC stated and considering that flow at the clay barrier layer represents flow through a porous medium, not flow over the clay barrier surface, as discussed above and therefore the same runoff to slope relationships would not apply, $\mathbf{c_1}$ is likely greater than the value of zero assumed by SMC. Similarly, the value of $\mathbf{c_3}$ used in the calculation of the runoff coefficient does not represent runoff over the smooth, uniform surface of the clay barrier layer in the as-built state and over cultivated farmland when degraded, as described by SMC, but flow through the biointrusion/drainage layer in its as-built and degraded states. SMC is possibly underestimating the values of $\mathbf{c_1}$ and $\mathbf{c_3}$ used in this method. If so, they are overestimating the runoff coefficient and underestimating infiltration.

Also, SMC describes the clay barrier layer ultimately developing the overall permeability of clayey loam and assigns the corresponding value of $\mathbf{c_2}$ for the maximum infiltration case in the equation to calculate $\mathbf{C_r}$. SMC states this change will occur over a very long time period and appears to only consider it occurring under the controls-fail condition. SMC does not provide any justification for the degree of change in the permeability of the clay layer, the length of time it would take to reach this state or why it would only reach this state under the controls-fail condition.

Furthermore, SMC does not describe how the range of values calculated for the runoff coefficient under the controls in-place and all controls fail conditions will be incorporated into the RESRAD dose modeling.

Path forward:

SMC should provide justification for why the rational method for calculating runoff from small watersheds described in this section is appropriate for describing runoff at the clay barrier layer and calculating the values for the runoff coefficient that will be used in the RESRAD dose modeling. In applying this method, SMC should provide stronger justification for the assumptions made about the values used for $\mathbf{c_1}$, $\mathbf{c_2}$ and $\mathbf{c_3}$ used to calculate the runoff coefficient under the various levels of degradation. Analysis of how runoff from the barrier changes with time should include an analysis of how the biointrusion/drainage layer degrades and how that degradation affects drainage from (flow through) the layer.

Alternatively, SMC could use a different method of calculating runoff from the engineered barrier that accounts for how each layer of the barrier affects the total amount of runoff from the barrier as a whole. Included in that analysis should be a discussion of how the individual layers of the barrier degrade over time under both the controls in-place and controls-fail conditions and how that degradation affects runoff.

SMC needs to describe how the values calculated for the runoff coefficient under the controls in-place and controls fail conditions will be used in the RESRAD dose modeling. SMC should also perform a sensitivity analysis on this parameter in the dose analysis and provide justification for the range of values used for the parameter in the sensitivity analysis.

36. In its evaluation of infiltration SMC does not account for the absence of vegetation from the rock cover in its estimation of evapotranspiration or runoff in the as-built state of the barrier. SMC also does not account for the possibility of vegetation taking root on the surface of the cover as it degrades over time under either the controls in-place or controls fail conditions.

Basis:

The use of values of potential evapotranspiration based on regional values for vegetated areas would overestimate evapotranspiration for the rock-only top layer of the cover and is not appropriate. The presence or absence of vegetation will have a significant affect on the evapotranspiration and runoff from the cover.

Path forward:

Analysis of evapotranspiration needs to be consistent with the state of the cover in the as-built condition (no vegetation present). Additionally, SMC should consider the presence or absence of vegetation on the surface of the engineered barrier in its evaluation of how infiltration changes as the barrier degrades over time under both the controls in-place and controls fail conditions. Depending on results of leach tests and overall performance of the engineered barrier, SMC should be aware of and possibly consider an alternative design in which the erosion control layer consists of a rock/soil matrix which either includes vegetation from the start or allows for vegetation to take root naturally over time and evaluate the infiltration that would occur from such a design.

37. SMC does not provide adequate justification for assumptions made about the level of degradation of the clay barrier and the values used to represent that degradation in its analysis of infiltration. (Attachment 6, page 2A, 4th paragraph)

Basis:

In describing the sensitivity analysis on the alternate method for calculating infiltration SMC varies the saturated hydraulic conductivity of the clay barrier layer by a factor of ten, but provides no basis for this being the limit of the degradation of the clay barrier layer. Some research on the performance of clay barriers indicates the hydraulic conductivity may increase by two or three orders of magnitude.

Path forward:

SMC should provide justification for assumptions made in its analysis of infiltration regarding the level of degradation of the barrier layers that occurs under both the controls in-place and controls-fail conditions. Justification should be provided for the ranges of values used in the sensitivity analysis. This justification should include examples from analog sites, field experiments, or citations from recent research, etc. SMC should explicitly describe how the results of this analysis will be utilized in the RESRAD dose modeling.

38. Assumptions related to freeze/thaw considerations need additional justification or revision. (Page B-5; 2nd paragraph)

Basis:

This section provides discussion of freeze/thaw considerations. In eliminating freeze/thaw as a concern, the 2nd paragraph includes statements that: 1) "…the SMC facility is located in an area that exhibits an extreme frost penetration of approximately 25 inches;" and 2) "…the proposed depth of the clay barrier ranges from 36 to 72 inches below the surface of the site". Based on a selection of penetration depth from Figure 13 of Attachment 3, it would appear that the extreme penetration depth is approximately 29.5 inches. However, the assessment of frost penetration depth should consider that estimation from large-scale regional maps is not generally recommended (Smith and Rager 2002). Variations in the physical properties of a soil may cause frost penetrations to vary by a factor of 2 or more. Regional sources do not necessarily represent site-specific temperatures and soil data. In addition, consideration of the depth of the clay barrier below the surface of the disposal cell should not include the thickness of the rock layers on the top and sides or the drainage layer, since these are not frost-limiting soil layers. This would change if SMC proposes to change the surface rock to a rock/soil matrix. Eliminating consideration of the current rock layers would result in the clay barrier depth being from 21 to 57 inches on top, and 12 to 48 inches on the sides.

Path forward:

SMC needs to correct the depth of frost penetration assessment based on the observations above and considering the methodology in the following Reference: "Protective Layer Design in Landfill Covers based on Frost Penetration," by Gregory M. Smith and Ronald E. Rager, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 128, Issue 9, pp 794-799, September 2002. Based on the re-assessment, SMC needs to modify its conclusions, or otherwise provide further justification of the original numbers given in the analysis.

39. The discussion does not make clear what engineered barrier components each of the 6 numbered materials corresponds to. Nor is there any basis provided for the material property assumptions, as discussed in RAI 2. (Page B-8; Section 1.4 and Attachment 4 Slope Stability Analysis)

Basis:

The slope stability analysis indicates that the modeling included 6 materials and provided assumptions of the properties of each of those materials. The discussion does not make clear

what engineered barrier components each of the 6 numbered materials corresponds to. In addition, there is no basis provided for the material property assumptions, as discussed in RAI 2.

Path forward:
SMC needs to indicate what engineered barrier components each of the 6 numbered materials corresponds to. In addition, SMC needs to provide the basis (from investigations and material testing) for slope stability property values assigned to each of the materials used as input to the modeling, including the subsurface materials.

40. Settlement Analysis: There is insufficient basis for the settlement conclusions. (Page B-9; Section 1.5)

Basis:

The discussion includes an assumption that all the subsurface materials are sand deposits subject to small rapid settlement, and that co-locating the contaminated materials as discussed in RAI 13 will eliminate any significant settlement of these materials. Therefore, SMC concludes settlement is not an issue. Regarding the subsurface materials, there should be site borings with Standard Penetration Test blow-counts to demonstrate there are no loose sands or layers of silts and clays that would invalidate the settlement assumption. In addition, as discussed in RAI 13, there is no basis for the assumption that the contaminated material placement approach will not result in voids and future settlement.

Path forward:

SMC needs to provide a stronger basis for its settlement assumptions, including information on subsurface soils from site investigations and material testing, and information on placement of contaminated materials in response to RAI 13.

41. Liquefaction: There needs to be a stronger basis for its liquefaction assumptions. (Page B-9; Section 1.6)

Basis:

The discussion includes an assumption that the subsurface consists only of non-loose sands and silts that are not subject to liquefaction. Again, there should be borings and site information to demonstrate this.

Path forward:

SMC needs to provide a stronger basis for its liquefaction assumptions, including site information and information on subsurface soils from site investigations and material testing. SMC is referred to Regulatory Guide 3.11, Rev 3 (ML082380144) for the process of liquefaction analysis. The Regulatory Guide may also be found on the NRC's Web Site.

42. Evaluation of Individual and Cumulative Impacts on the Performance of the Engineered Barrier: Somewhere in this documentation, perhaps in this section, there

needs to be a more complete tie to the dose modeling analysis. (Page B-12; Section 1.8)

Basis:

This section provides generally an assessment of certain potential degradation mechanisms on the groundwater pathway for dose modeling. Somewhere in this documentation, perhaps in this section, there needs to be a more complete tie to the dose modeling analysis, including what degradation assumptions will be made to input the dose model scenarios under both control and loss-of-control situations, and plans to identify how much degradation would have to occur to result in non-compliance under the loss-of-control situation.

Path forward:

SMC needs to include in the engineered barrier documentation a more complete tie to the dose modeling analysis, including but not limited to: 1) what degradation assumptions will be made to input the dose model scenarios under both control and loss-of-control situations; and 2) plans to identify how much degradation would have to occur to result in non-compliance under the loss-of-control situation.

Appendix C (Quality Assurance and Quality Control Construction Plan)

43. Explain that the purpose of the petrographic analyses is to confirm the absence or presence of small, insignificant amounts of potentially adverse minerals such as olivine and sericite.

Basis:

Page 3-8 states that a petrographic analysis would be completed in accordance with ASTM C-295-90. However, specific objectives of the petrographic analysis also should be identified and should include, confirming the absence or small, insignificant amounts of potentially adverse minerals such as olivine and sericite.

Path Forward:

Revise the procedure as suggested above.

Appendix D (Operation and Maintenance Plan)

44. The boundary for the restricted use area shown on Figure 2-3 is incorrect.

Basis:

Figure 2-4 on page 2-1 shows the new footprint of the engineered barrier falling outside of the restricted use area boundary.

Path Forward:

Revise Figure 2-3 by changing the restricted use area boundary that incorporates the new footprint of the engineered barrier or revise the footprint. The revised boundary of the restricted area should also consider the long-term monitoring plans when revised to include the location of future groundwater monitoring wells and the need to maintain controls on these wells.

45. Consider approaches to monitor and confirm the engineered barrier system's performance for limiting infiltration and potential leaching of the contaminated materials.

Basis:

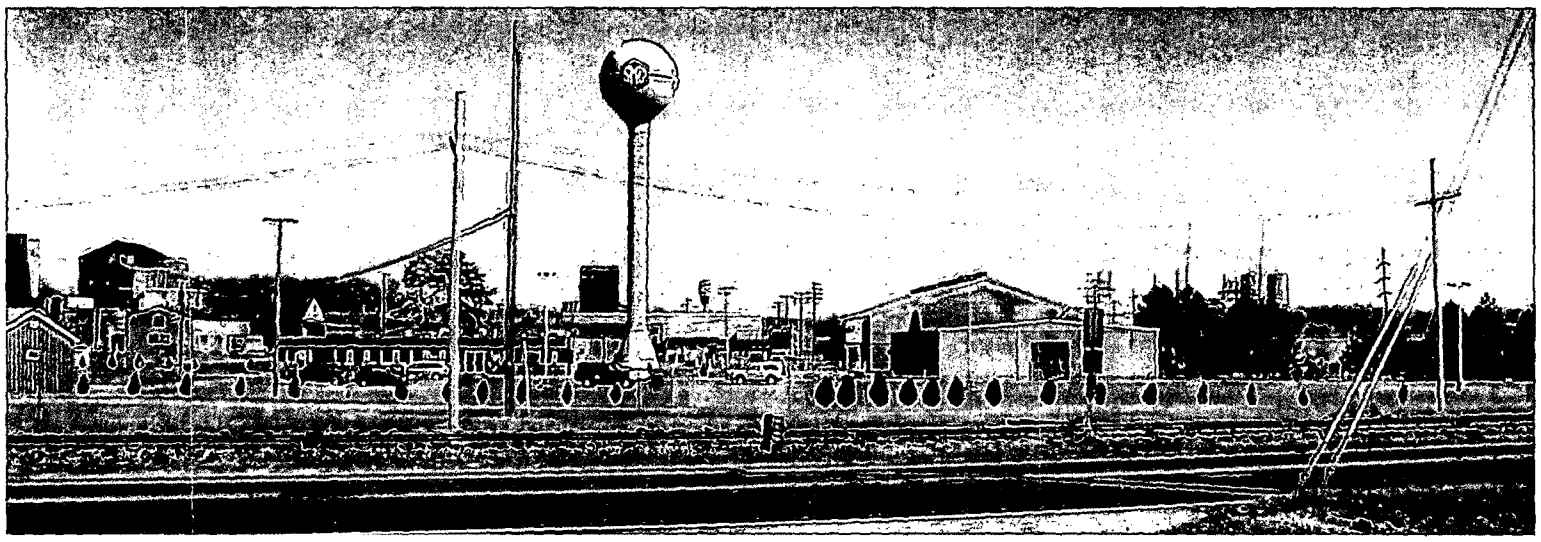
Monitoring the soil moisture of the clay layer is the only monitoring proposed for the engineered barrier other than surveillance. No monitoring is proposed to confirm the engineered barrier total system performance for limiting infiltration, or no justification is given for not proposing this type of monitoring. Ongoing results of ACAP studies (Malusis, M. and Benson, C. (2006). "Lysimeters versus Water-Content Sensors for Performance Monitoring of Alternative Earthen Final Covers." Unsaturated Soils, Geotechnical Special Publication 147, 1, ASCE741-752.) indicate that direct measurement of percolation is the only means to accurately assess the hydrologic performance of covers and that large-scale measurements of percolation are needed because soil properties in covers are scale dependent and heterogeneous.

Furthermore, the potential need for confirmatory sampling and analyses for radionuclides in the water that has percolated through the pile was not discussed.

Path Forward:

Discuss the applicability of the results of recent ongoing studies on the effectiveness of monitoring programs to verify cover performance for reducing infiltration such as reported by the references given above. Discuss long-term monitoring methods and duration for the total system or justify why such long-term monitoring is not needed.

Discuss the sampling and analysis plans for radionuclides in the water that has percolated through the pile considering the results of ongoing leach tests and sampling under the piles. If no long-term confirmatory testing is proposed, provide the justification for this decision.



DECOMMISSIONING PLAN

SHIELDALLOY METALLURGICAL CORPORATION

NEWFIELD, NEW JERSEY

REVISION 1b: AUGUST 2009

Prepared by

Integrated Environmental Management, Inc. *and* **TRC Environmental Corporation**

Decommissioning Plan for the SMC Facility

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1 EXECUTIVE SUMMARY

ES 1.1 Introduction and Objective of the Decommissioning Plan

This Decommissioning Plan (Rev. 1b) (DP) describes the remedial actions that will be implemented and the radiological release criteria that will be used by Shieldalloy Metallurgical Corporation (SMC) to decommission its Newfield, New Jersey facility (SMC facility). SMC holds radioactive Materials License No. SMB-743 issued by the U.S. Nuclear Regulatory Commission (NRC). Once decommissioning is completed in accordance with this DP, SMC will seek to amend License No. SMB-743 to incorporate "long term control" (LTC) requirements as further described below. The following is the name and address of the licensee and owner of the SMC facility:

Shieldalloy Metallurgical Corporation
35 South West Boulevard
Newfield, New Jersey 08344-0768

SMC's objective in submitting this DP is to provide the NRC with sufficient information to allow the agency to approve the plan, authorize SMC to implement it in its entirety and, following decommissioning, release the majority of the site for redevelopment, while amending License No. SMB-743 to incorporate LTC provisions and restrict the licensed area to a smaller, 11.7 acre portion, of the 67.7 acre site. The area subject to the amended license would contain the remaining radioactive materials at the site, consolidated into a single pile and then covered by a massive, robust and durable multi-layer engineered barrier. The purpose of the LTC requirements is to ensure compliance with the criteria in 10 CFR 20.1403 for license termination under restricted conditions, including that the radiation dose potential to any member of the public be as low as is reasonably achievable (ALARA), and that legally enforceable institutional controls remain in place. The amended license will also require that a suitable and adequately funded program for the management, control, maintenance, monitoring and repair of the licensed area be in place for a period of 1,000 years, under the supervision and control of the NRC. The remaining 56 acres of the site, currently covered by License No. SMB-743, would be surveyed to demonstrate its radiological status complies with the requirements of 10 CFR 20.1402, then released for unrestricted use so that it can be devoted to light industrial development or other appropriate uses.

The decommissioning option selected for the SMC facility, called the Long Term Control Alternative (LTC Alternative), is consistent with all applicable regulations. It will result in no measurable radiation doses to any member of the public, and is safer and has fewer environmental impacts than any other viable option for the decommissioning of this site. The following sections summarize the contents of each chapter of the DP.

ES 1.2 Summary and History of Licensed Activities

Metal and metal alloy manufacturing operations at the SMC facility began in the late 1950s and early 1960s. An application to utilize ores that contained trace radioactive elements in concentrations that were classified as "source material" in 10 CFR 40 was submitted by a previous owner of the SMC facility to the Atomic Energy Commission (AEC) in 1963. Source material is defined pursuant to 10 CFR 40.4 as:

> *Uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) Uranium, (ii) thorium or (iii) any combination thereof. Source material does not include special nuclear material.*

rather than to crush them and relocate them to the EnergySolutions, Utah facility where they would also be consolidated and capped. The radioactivity in the slags and baghouse dust at the SMC facility cannot be destroyed or effectively extracted. This means that whether they are capped in place in Newfield or transported to Utah and disposed of at the EnergySolutions facility, the resulting dose potential to future receptors would be the same. However, in Utah the materials would be commingled with much more radioactive materials such that failure or breach of the engineered barrier at that site could result in higher doses to future receptors.

The risks associated with the LTC Alternative include those associated with consolidating the materials in the Storage Yard and constructing the engineered barrier over them. Those risks are significantly lower than those associated with the multi-step process of getting the materials to the State of Utah (i.e., crushing the materials, loading them into rail cars, transporting them to Utah by train, unloading them in Utah, consolidating them with other radioactive materials, and constructing and maintaining an engineered barrier in Utah).

In short, in preparing Rev. 1b of the DP, SMC has become even more convinced that the LTC Alternative is not only safe, but the only acceptable option for the residual materials currently at the site.

ES 1.7 Environmental Impact of the Proposed Action

Chapter 6 directs the reader to the Environmental Report (ER), a substantial appendix (Appendix 19.1) to the DP that addresses the environmental, ecological, societal and safety aspects of the proposed action and alternatives thereto, as required by the National Environmental Policy Act (NEPA).

ES 1.8 Planned Decommissioning Activities

Chapter 8 describes SMC's approach to implementing the LTC Alternative. SMC will consolidate all residual radioactivity into an 11.7-acre portion of the Storage Yard located on the north eastern boundary of the SMC facility. There, the consolidated materials will be shaped, graded, and covered with a massive seven-layer engineered barrier that provides a substantial and highly durable resistance to rainwater infiltration that will last for at least 1,000 years, even without any maintenance or repair. The LTC Alternative also includes an NRC-supervised, fully funded long-term management, maintenance, monitoring and reporting program for the next 1,000 years. Once the decommissioning of the site is complete and the LTC requirements implemented, no member of the public will incur a radiation dose that is distinguishable from background as a result of the 11.7-acre restricted area. The remaining 56 acres of the SMC facility will be released for unrestricted use and are expected to be redeveloped for industrial use.

The *in situ* decommissioning methodology outlined in this DP is a proven technology for slag materials. Federal and state regulatory authorities have accepted and approved similar plans elsewhere. For example, at a site in Ohio, where similar operations utilizing pyrochlore to produce ferrocolumbium, in similar quantities and with similar radiological characteristics to those at the SMC facility took place, the NRC and the State agreed that the *in situ* decommissioning option was the safest and most effective approach.[2,3] That site has since been safely and effectively

[2] U. S. Nuclear Regulatory Commission, NUREG-1543, "Environmental Impact Statement; Decommissioning of the Shieldalloy Metallurgical Corporation Cambridge, Ohio Facility", July, 1996.

[3] PTI Environmental Services, "Remedial Investigation and Feasibility Study at the Shieldalloy Metallurgical Corporation Site in Cambridge, Ohio", September, 1996.

Using the same air modeling results as for the LTC remediation workers, the intake potential during these operations within the primary controlled area (i.e., the location of maximum airborne emissions) is conservatively assumed to be the same as for the workers. As shown in Appendix N of the ER, the exposure duration is 512 hours per year for a one year construction period, followed by 8,076 hours per year thereafter. The ambient exposure rate during construction is similar to that for the workers, or about 20 microR per hour.

LT Alternative

For the LT Alternative, radiological conditions associated with the processing and packaging the residual radioactivity currently in the Storage Yard for shipment to the disposal site in Utah also presents the potential for direct radiation exposure and inhalation of airborne radioactivity by members of the public. In addition, members of the public may incur direct exposure during the transportation of the residual radioactivity to the Utah disposal site, and as a result of site operations while the license is active and after the site is closed. However, the dose potential to the public in Utah has not been included in the evaluation.

Using the same air modeling results as for the LT remediation workers, the intake potential during these operations within the primary controlled area (i.e., the location of maximum airborne emissions) is assumed to be the same as for the workers. The exposure duration is 840 hours per year for a two year construction period, followed by 8,076 hours per year thereafter (see Appendix N of the ER). The ambient exposure rate during construction is similar to that for the workers, or about 20 microR per hour.

IRSlag, IRNonslag and IR50 Slag Alternatives

The incremental removal alternatives, would have collective doses/costs that are a composite of the LC and LT doses/costs.

7.3.5 Summary of Costs ($COST_T$)

Appendix 19.12 contains a copy of the spreadsheets used to determine the various costs associated with each of the decommissioning alternatives. The following table is a summary of $COST_T$ for each:

Alternative	$COST_R$ and $COST_{WD}$	$COST_{ACC}$	$COST_{TF}$	$COST_{WDose}$	$COST_{PDose}$	$Cost_T$
LC Alternative	$ 9,237,500	$ 0	$ 0	$ 1,452	$ 264,253	$9,503,205
LTC Alternative	$ 14,716,265	$ 1,790	$ 5,038	$ 124	$ 657,357	$15,380,575
LT Alternative	$ 70,434,830	$ 2,117	$ 10,397,015	$ 351	$ 1,988,117	$82,822,429
IRSlag Alternative	$ 42,501,572	$ 1,984	$ 5,898,554	$ 393	$ 1,992,525	$50,395,028
IRNonslag Alternative	$ 42,649,523	$ 1,986	$ 4,672,583	$ 392	$ 1,992,300	$49,316,784
IR50 Alternative	$ 28,608,918	$ 1,812	$ 2,916,024	$ 394	$ 1,993578	$33,520,727

7.4 Cost/Benefit Analysis

The spreadsheets in Appendix 19.12 also show the results of the analysis described in Section 7.2, above for each of the alternatives. In all cases the ratio of *Conc* to DCGL is significantly higher than one (1), which means all six of the alternatives meet the ALARA requirement as long as the applicable dose limits are met. In fact, the ratio is lowest for the "no action" alternative (i.e., LC Alternative), which is not a viable option for the SMC facility. Therefore, to select the preferred

alternative, the ratio of *Conc* to DCGL was normalized to the LC Alternative, with results shown in the following table:

Alternative	*Conc*/DCGL	*Conc*/DCGL Differential from the LC Alternative
LC Alternative	335,650	0
LTC Alternative	543,237	207,587
LT Alternative	2,925,264	2,589,614
IRSlag Alternative	1,779,938	1,444,288
IRNonslag Alternative	1,741,855	1,406,205
IR50 Alternative	1,183,942	848,292

The table shows the LTC Alternative to be preferred for the decommissioning of the SMC facility because it provides the greatest cost-benefit.[143] Further reduction in residual radioactivity to comply with the release criteria should not be made because the residual levels associated with restricted conditions are ALARA.

7.5 Computation of Benefits

There are a number of potential benefits associated with each of the considered alternatives. These include the following: (1) Changes in land values; (2) Reduction in public opposition; (3) Aesthetics; (4) Regulatory costs avoided; and (5) Collective dose averted. The following subsections discuss these benefits.

7.5.1 Changes in Land Values

During the actual implementation of the various alternatives, no impacts on the economic use of the property are expected to result because the actions associated with each alternative are basically limited to the Storage Yard and adjacent areas that are not currently being developed. Therefore, this evaluation focuses on potential impacts on land value once the alternatives have been implemented.

Long-term changes in land value associated with the implementation of the alternatives are difficult to estimate as they not only involve the normal variables associated with real estate cycles, but also such intangible factors as the potential stigma associated with a real or perceived environmental hazard, changes in science which may impact existing risk analyses, and potential future liability associated with regulatory changes. More practical but still intangible factors a potential developer might face includes problems associated with achieving financing for such a property or the general "trouble factor" of dealing with such a property.[144] Since each of these variables can significantly impact future land values, they are extremely difficult to predict and impossible to quantify. Recent residential developments close to the SMC facility, and in one case adjacent, suggests there is currently little concern about the presence of the materials in the Storage Yard. Therefore, the evaluation presented below focuses on a qualitative evaluation of potential impacts on land value associated with each of the alternatives.

[143] This finding does not change if the monetary discount rate is reduced from 3% to 1%.

[144] Recent residential developments close to the SMC facility, and in one case adjacent, suggests there is currently little concern about the presence of the materials in the Storage Yard.

controls are provided. The size of the restricted area has been set as a footprint that surrounds the engineered barrier.

16.3.1 Description of Legally-Enforceable and Durable Institutional Controls

The primary means of ensuring institutional control over the restricted area of the decommissioned SMC facility will be perpetual NRC oversight in accordance with the provisions outlined herein. The form of control will be set forth in an amendment of License No. SMB-743 after completion and regulatory approval of decommissioning activities. Under the terms of the amended license, SMC will be legally required to remain in compliance with the conditions of the license and, as with any licensee, take the necessary corrective actions if not in compliance.

The purpose of imposing LTC restrictions on the license is to provide the legally enforceable and durable institutional controls required by 10 CFR 20.1403(b) to ensure the long-term protection of the public health, safety, and the environment. The conditions written into the license by the NRC would specify the necessary controls to limit site access and land use that SMC must monitor and maintain and that the NRC would inspect and enforce, if necessary. These controls would be expected to include the following:

- Prohibitions on agricultural, residential and industrial activities within the restricted area;
- Prohibitions on demolition, excavation, digging, drilling or any other activity that might result in the removal or breach of the engineered barrier;
- Prohibitions on the disturbance of soil or ground water within the restricted area;
- Prohibitions on the use or removal of soil or ground water from the restricted area.

The amended license will also specify other required long-term control activities to be conducted by SMC. These would include the following:

- Fence maintenance;
- Warning sign maintenance;
- Periodic inspections of the restricted area and the engineered barrier for settlement, erosion or other breaches;
- Routine and adverse-event monitoring of the ambient radiation environment;
- Adverse event surveillance;
- Visitor access logs;
- Planned and periodic audits of the long-term control program; and
- Air and/or ground water monitoring to be undertaken only in the event of a significant breach of the engineered barrier.

In addition, SMC will document the LTC restrictions established in the license in the form of a legal title document recognized by and recorded with Gloucester County. The contents of the deed notice will be prepared and submitted for NRC approval as part of the license amendment application to add the LTC provisions to License No. SMB-743. Once filed, it will also serve to alert any future owners of the restricted area that the property brings with it all of the obligations of License No. SMB-743, and that they must establish, re-record and maintain a deed notice, to be approved by the NRC, as a condition of the license.

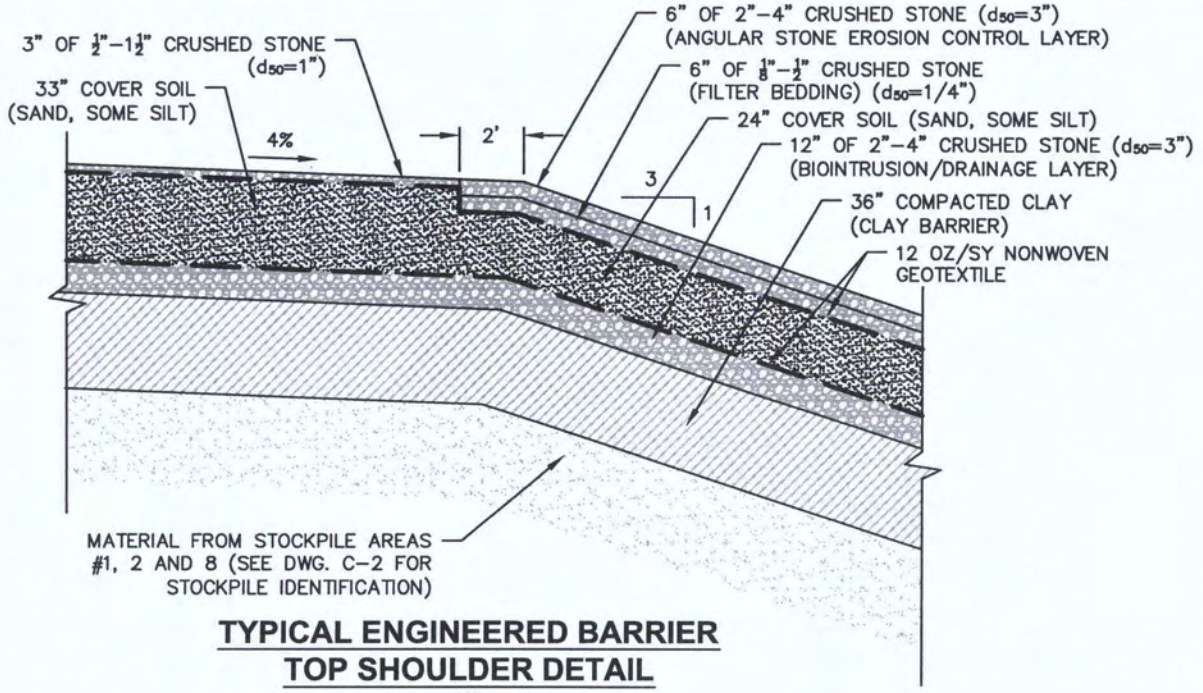
The duration of these controls will be permanent in light of the long half-life of the radioactivity consolidated under the engineered barrier. However, the license will be renewed in five-year increments. Independent oversight of SMC's performance in light of the LTC requirements will be provided by the NRC during routine inspections and license renewal activities. In the event of SMC default in the LTC terms and conditions of the license, the NRC has the authority to terminate the license, assume control of the funds held in trust, and contract the services of a third party to implement the license requirements.

In addition to the institutional controls described above, other institutional controls will be established under a natural resources damage settlement implementing CERCLA remedial actions at the facility. The natural resource restoration requirements applicable to 9.65 acres of the SMC facility (outside of the limits of the Storage Yard), will necessitate the planting and maintenance of upland tree areas, a requirement that will help prevent future development of the planted areas. In addition, all CERCLA soil remedial analyses conducted for the SMC facility to date have been based on the use of non-residential soil cleanup criteria in combination with institutional controls to prevent future residential site use, in keeping with New Jersey site remediation regulations. Therefore, it is fully expected that once CERCLA soil remediation activities are complete, residential use of the site will be precluded by institutional controls will be implemented in accordance with NJAC 7:26E-8. The requirements for institutional controls established at NJAC 7:26E-8 include continued monitoring of future land use and the submittal of biennial reports certifying that the institutional control(s) are being maintained in a manner that is protective of human health.

16.3.2 Activities to Control Access

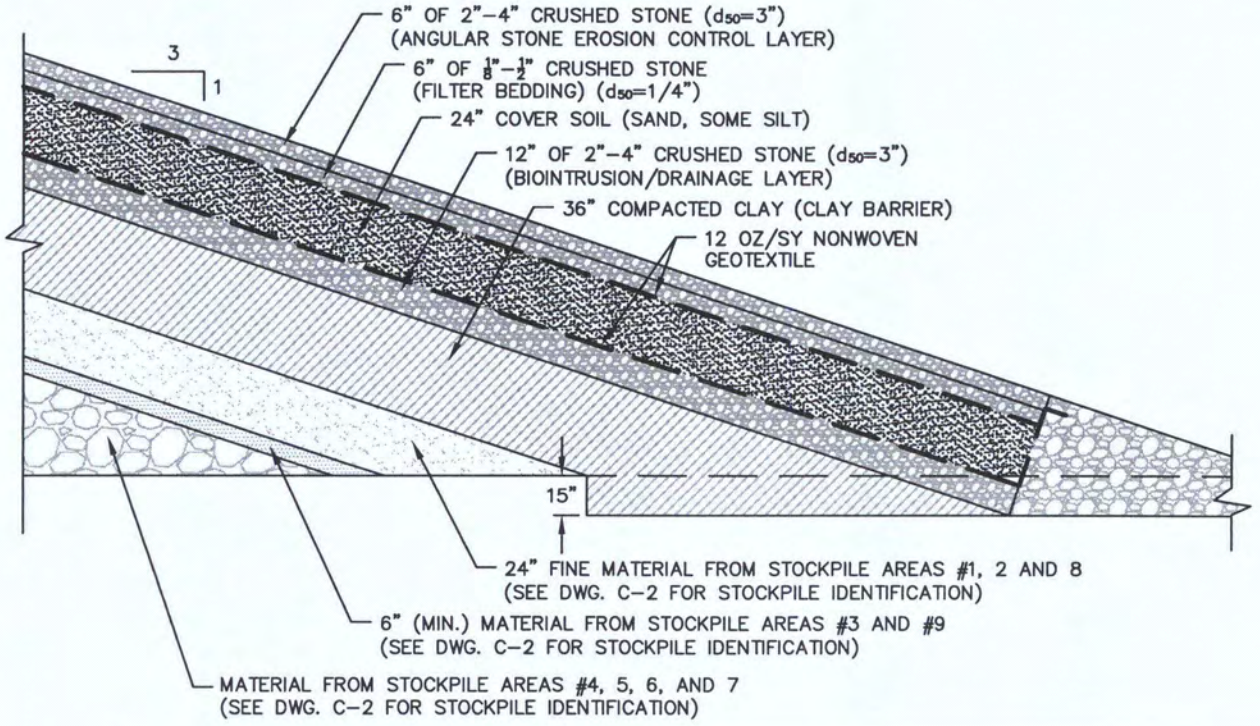
To control access to and use of the restricted area while under SMC ownership, a variety of institutional controls, including physical, legal, and administrative mechanisms to control access to the restricted area as described in the following, will be implemented:

- SMC will control access to and activities on the engineered barrier through the use of fencing.
- Warning signs will be posted along the fence line and at all access points (gates).
- SMC will conduct periodic inspections of the restricted area to ensure access is being controlled.
- SMC will conduct adverse event surveillance (e.g., after major storms, evidence of intruders is identified, damage to the perimeter fence, etc.) as warranted.
- Records of visitors to the restricted area will be prepared and maintained by SMC.



TYPICAL ENGINEERED BARRIER TOP SHOULDER DETAIL

NTS



TYPICAL ENGINEERED BARRIER SIDE SLOPE TOE DETAIL

NTS

TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL
NEWFIELD, NEW JERSEY

FIGURE 18.8
ENGINEERED BARRIER CONSTRUCTION DETAILS

Date: 08/09 | Project No. 105106.000100.000000

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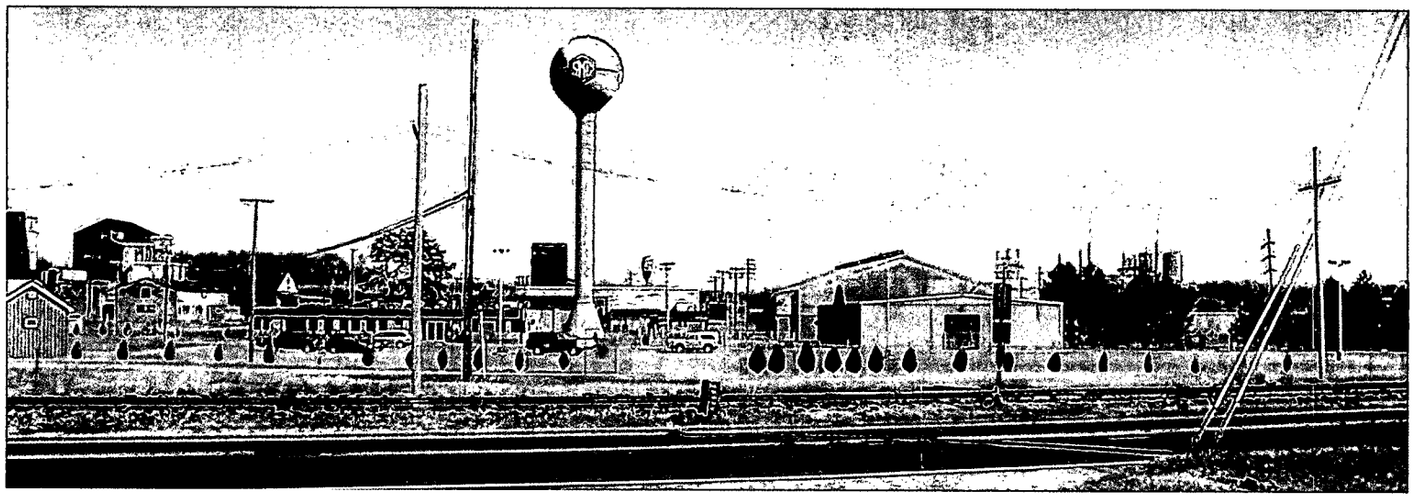
Fig 18.8.dwg Layout:FIG 18.8 August 24, 2009–8:27AM Khollenbeck



DECOMMISSIONING PLAN

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

REVISION 1b: AUGUST 2009

Appendix 19.1 ENVIRONMENTAL REPORT
Report, Figures, Tables and Appendix A-C

Volume 1 of 2

Prepared by

Integrated Environmental Management, Inc. *and* **TRC Environmental Corporation**

surrounds the Newfield Borough boundary in Gloucester County. A site location map is provided in Figure 1-1. The manufacturing portion of the facility and associated support areas cover approximately 27.4 hectares (67.7 acres). The approximate center of the facility is located at latitude 39°32'27.6"N, longitude 75°01'06.7"W. SMC also owns an additional 8 hectares (19.8 acres) of farmland, located approximately 610 meters (2,000 feet) southwest of the main facility in Vineland, Cumberland County, New Jersey. Since SMC has never used this property for manufacturing or related activities, this report focuses on the main 27.4-hectare (67.7-acre) facility area, referred to herein as the SMC facility.

The SMC facility is bounded to the north by a former rail spur and to the west by Conrail rail lines and by West Boulevard and its homes and businesses. Woods, residences and small businesses are present to the east of the SMC facility. The southern property line is bounded by the Hudson Branch, its associated wetlands/headwaters, and an unnamed pond. Residences are located along Weymouth Road, south of the Hudson Branch.

The majority of the SMC facility is surrounded by secure steel-wire fencing, except for a small portion of the property along the western property boundary, where the facility parking lot is located. A detailed plan depicting the boundaries and physical features of the facility is provided as Figure 1-2. In Figure 1-3, this plan is shown overlaying an aerial photo of the facility taken in October 2000. A more recent aerial photo of the facility (January 2005) is provided in Figure 1-4. A topographical map (January 2005) of the SMC facility is provided as Plate A.

1.3.2 Site Use and History

The SMC facility manufactured specialty steel and super alloy additives, primary aluminum master alloys, metal carbides, powdered metals and optical surfacing products. Raw materials used at the facility included ores which contain oxides of columbium (niobium), vanadium, aluminum metal, titanium metal, strontium metal, zirconium metal, and fluoride (titanium and boron) salts. During the manufacturing process, slag, dross and baghouse dust were generated.

New Jersey Judiciary

Superior Court - Appellate Division

NOTICE OF APPEAL

RECEIVED
APPELLATE DIVISION
SEP 14 2009
SUPERIOR COURT
OF NEW JERSEY

Type or clearly print all information. Attach additional sheets if necessary.	ATTORNEY / LAW FIRM / PRO SE LITIGANT (2)
TITLE IN FULL (AS CAPTIONED BELOW): (1) In re: N.J.A.C. 7:28	NAME Dennis J. Krumholz Riker Danzig Scherer Hyland & Perretti, LLP STREET ADDRESS Headquarters Plaza, One Speedwell Avenue CITY: Morristown | STATE: NJ | ZIP: 07962 | PHONE NUMBER: 973.538.0800 EMAIL ADDRESS: dkrumholz@riker.com

ON APPEAL FROM

TRIAL COURT JUDGE (3)	TRIAL COURT OR STATE AGENCY (4)	TRIAL COURT OR AGENCY NUMBER (5)
	Department of Environmental Protection (DEP)	

(7) Notice is hereby given that (6) Shieldalloy Metallurgical Corporation appeals to the Appellate Division from a ☐ Judgment or ☐ Order entered on _____ in the ☐ Civil ☐ Criminal or ☐ Family Part of the Superior Court or from a ☒ State Agency decision entered on (regulations made effective on) 9/15/2008 and 8/7/2000.

(8) If not appealing the entire judgment, order or agency decision, specify what parts or paragraphs are being appealed: On August 20, 2008, the Commissioner of the NJDEP and the Commission on Radiation Protection adopted rules in furtherance of the State's request to the Nuclear Regulatory Commission ("NRC) for "Agreement State" status -- thereby to obtain jurisdiction over many NRC licensees located within New Jersey -- including standards for decommissioning facilities possessing licensed radioactive material. See N.J.A.C. 7:28 and 40 N.J.R. 5196 (September 15, 2008). These rules also would apply NJDEP's soil remediation standards for radioactive materials, see 32 N.J.R. 2866 (August 7, 2000), to facilities currently licensed by the NRC.

(9) Have all issues, as to all parties in this action, before the trial court or agency been disposed of? (In consolidated actions, all issues as to all parties in all actions must have been disposed of.) N/A ☐ Yes ☐ No

If not, has the order been properly certified as final pursuant to R. 4:42-2? ☐ Yes ☐ No

For criminal, quasi-criminal and juvenile actions only:

(10A) Give a concise statement of the offense and the judgment including date entered and any sentence or disposition imposed:

(10B) This appeal is from a ☐ conviction ☐ post judgment motion ☐ post-conviction relief.

If post-conviction relief, is it the ☐ 1st ☐ 2nd ☐ other _____ (Specify)

(10C) Is defendant incarcerated? ☐ Yes ☐ No

Was bail granted or the sentence or disposition stayed? ☐ Yes ☐ No

(10D) If in custody, name the place of confinement:

Defendant was represented below by:

☐ Public Defender ☐ self ☐ private counsel _____ (specify)

Revised effective 9/01/2008

3980026.1

(11) Notice of appeal and attached case information statement have been served where applicable on the following:

	Name	Date of Service
Trial Court Judge		
Trial Court Division Manager		
Tax Court Administrator		
State Agency	Dept. of Environmental Protection	September 14, 2009
Attorney General or Attorney for other Governmental body pursuant to R. 2:5-1(a), (e) or (h)	Dept. of Law and Public Safety, Division of Law	September 14, 2009

Other parties in this action:

Name and Designation	Attorney Name, Address and Telephone No.	Date of Service

(12) Attached transcript request form has been served where applicable on the following:

	Name	Date of Service	Amount of Deposit
Trial Court Transcript Office			
Court Reporter (if applicable)			
Supervisor of Court Reporters			
Clerk of the Tax Court			
State Agency			

(13) Exempt from submitting the transcript request form due to the following:

☒ No verbatim record.

☐ Transcript in possession of attorney or pro se litigant (four copies of the transcript must be submitted along with an electronic copy).
List the date(s) of the trial or hearing:

☐ Motion for abbreviation of transcript filed with the court or agency below. Attach copy.

☐ Motion for free transcript filed with the court below. Attach copy.

I certify that the foregoing statements are true to the best of my knowledge, information and belief.

I also certify that, unless exempt, the filing fee required by N.J.S.A. 22A:2 has been paid.

(14) September 14, 2009 (15) Dennis J. Kunhardt
DATE SIGNATURE OF ATTORNEY OR PRO SE LITIGANT

Page 2 of 2

3980026.1

New Jersey Judiciary

Superior Court - Appellate Division

CIVIL CASE INFORMATION STATEMENT

Please type or clearly print all information.

TITLE IN FULL (1)	TRIAL COURT OR AGENCY DOCKET NUMBER (2)
Radiation Protection Programs, Adopted Repeals, New Rules and Amendments: N.J.A.C. 7:28, Radiation Protection Programs, adopted August 20, 2008; Soil Remediation Standards for Radioactive Materials, Adopted New Rules: N.J.A.C. 7:28-12, adopted June 21, 2000.	DEP Docket Numbers: 04-08-04/627, 11-99-06/697

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SEP 14 2009
SUPERIOR COURT
OF NEW JERSEY

- Attach additional sheets as necessary for any information below.

(3) APPELLANT'S ATTORNEY EMAIL ADDRESS: dkrumholz@riker.com

☐ PLAINTIFF ☐ DEFENDANT ☒ OTHER (SPECIFY) Appellant

NAME	CLIENT
Dennis J. Krumholz, Riker Danzig Scherer Hyland & Perretti LLP	Shieldalloy Metallurgical Corporation

STREET ADDRESS	CITY	STATE	ZIP	TELEPHONE NUMBER
Headquarters Plaza, One Speedwell Avenue	Morristown	NJ	07962	973.538.0800

(4) RESPONDENT'S ATTORNEY * EMAIL ADDRESS:

NAME	CLIENT
New Jersey Dept. of Law and Public Safety, Division of Law	New Jersey Dept. of Environmental Protection

STREET ADDRESS	CITY	STATE	ZIP	TELEPHONE NUMBER
25 Market Street, P.O. Box 112	Trenton	NJ	08625	609.984.3900

* Indicate which parties, if any, did not participate below or were no longer parties to the action at the time of entry of the judgment or decision being appealed.

(5) GIVE DATE AND SUMMARY OF JUDGMENT, ORDER, OR DECISION BEING APPEALED AND ATTACH A COPY:

On August 20, 2008, the Commissioner of the NJDEP and the Commission on Radiation Protection adopted rules in furtherance of the State's request to the Nuclear Regulatory Commission ("NRC) for "Agreement State" status -- thereby to obtain jurisdiction over many NRC licensees located within New Jersey – including standards for decommissioning facilities possessing licensed radioactive material. See 40 N.J.R. 5196 (September 15, 2008). These rules also would apply NJDEP's soil remediation standards for radioactive materials, see 32 N.J.R. 2866 (August 7, 2000), to facilities currently licensed by the NRC.

(6) Are there any claims against any party below, either in this or a consolidated action, which have not been disposed of, including counterclaims, cross-claims, third party claims and applications for counsel fees? ☐ Yes ☒ No

If so, has the order been properly certified as final pursuant to R. 4:42-2? (If not, leave to appeal must be sought. R. 2:2-4, 2:5-6.) ☐ Yes ☐ No

(If the order has been certified, attach, together with a copy of the order, a copy of the complaint or any other relevant pleadings and a brief explanation as to why the order qualified for certification pursuant to R. 4:42-2.)

(7) Is the validity of a statute, regulation, executive order, franchise or constitutional provision of this State being questioned? (R. 2:5-1(h)) ☒ Yes ☐ No

(8) GIVE A BRIEF STATEMENT OF THE FACTS AND PROCEDURAL HISTORY:

Shieldalloy Metallurgical Corporation ("Shieldalloy") is licensed by the NRC to possess certain radioactive material at its facility in Newfield, New Jersey, and it proposes to decommission this facility in accordance with federal standards; Shieldalloy's Decommissioning Plan is pending before the NRC. Shieldalloy is challenging the rules and standards adopted by the NJDEP Commissioner and by the Commission on Radiation Protection in furtherance of the State's request to the NRC for "Agreement State" status including standards for decommissioning facilities possessing licensed radioactive material. NJDEP has advised Shieldalloy that, upon assumption of Agreement State status, it will reject the company's proposed decommissioning methods as contrary to NJDEP's new rules and standards.

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(9) TO THE EXTENT POSSIBLE, LIST THE PROPOSED ISSUES TO BE RAISED ON THE APPEAL AS THEY WILL BE DESCRIBED IN APPROPRIATE POINT HEADINGS PURSUANT TO R. 2:6-2(a)(5). (Appellant or cross-appellant only.):

I. The Radiation Protection Programs rules, N.J.A.C. 7:28 ("Rules"), are invalid because they were not adopted in accordance with the requirements of the State Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq. ("APA"), including those for federal, regulatory and fiscal impact analyses. Significant changes made upon adoption of the Rules, as contrasted with the rule proposal, require further publication and opportunity for public comment before the Rules may be adopted. Other aspects of the Rules and adoption also violate the APA.

II. The requirement of the Rules that, upon commencing the decommissioning of a facility, a licensee must address the potential impacts of radiation that theoretically may occur thousands, hundreds of thousands and even millions of years into the future is arbitrary and capricious and without basis in fact or law.

III. The Rules are ultra vires and arbitrary and capricious because they exceed the scope of the Radiation Protection Act, N.J.S.A. 26:2D et seq., which only authorizes regulation of "unnecessary radiation." One effect of the Rules is to require low level radioactive materials to be excavated and transported off-site for disposal; this practice will expose the public, agriculture and the environment to unnecessary radiation.

IV. NJDEP relies upon the Brownfields and Contaminated Site Remediation Act, N.J.S.A. 58:10B-1 et seq. ("Brownfields Act"), for authority to develop the cleanup standards set forth in the Rules; however, the Brownfields Act does not provide any such authority. For example, it does not authorize cleanup standards for radiation. It also limits NJDEP's authority to the development of a cleanup standard for individual hazardous substances, not for the cleanup standards in the Rules which are based upon the cumulative radiological effects of radionuclides.

V. In the alternative, if the Brownfields Act does authorize development of cleanup standards for radiation and radionuclides, the standards set forth in the Rules are ultra vires, arbitrary and capricious because they do not comply with the requirements to develop cleanup standards as prescribed by the Brownfields Act.

VI. Contrary to the Federal and State Constitution and the APA, the Rules amount to special legislation or rulemaking directed solely at Shieldalloy, and they deny the company equal protection of the law.

(10) IF YOU ARE APPEALING FROM A JUDGMENT ENTERED BY A TRIAL JUDGE SITTING WITHOUT A JURY OR FROM AN ORDER OF THE TRIAL COURT, COMPLETE THE FOLLOWING:

1. Did the trial judge issue oral findings or an opinion? If so, on what date? N/A ☐ Yes ☐ No
2. Did the trial judge issue written findings or an opinion? If so, on what date? N/A ☐ Yes ☐ No
3. Will the trial judge be filing a statement or an opinion pursuant to R. 2:5-1(b)? ☐ Yes ☐ No

Caution: Before you indicate that there was neither findings nor an opinion, you should inquire of the trial judge to determine whether findings or an opinion was placed on the record out of counsel's presence or whether the judge will be filing a statement or opinion pursuant to R. 2:5-1(b).

DATE OF YOUR INQUIRY: _____

1. IS THERE ANY APPEAL NOW PENDING OR ABOUT TO BE BROUGHT BEFORE THIS COURT WHICH:

(11) (A) Arises from substantially the same case or controversy as this appeal? ☐ Yes ☒ No

(12) (B) Involves an issue that is substantially the same, similar or related to an issue in this appeal? Unknown ☐ Yes ☐ No

(13) 2. WAS THERE ANY PRIOR APPEAL INVOLVING THIS CASE OR CONTROVERSY: ☐ Yes ☒ No

(14) IF THE ANSWER TO EITHER 1 OR 2 ABOVE IS YES, STATE:

Case Name: Appellate Division Docket Number:

Civil appeals are screened for submission to the Civil Appeals Settlement Program (CASP) to determine their potential for settlement or, in the alternative, a simplification of the issues and any other matters that may aid in the disposition or handling of the appeal. Please consider these when responding to the following question. A negative response will not necessarily rule out the scheduling of a preargument conference.

State whether you think this case may benefit from a CASP conference. ☒ Yes ☐ No

(15) Explain your answer: Appellant is amenable to participation in a settlement conference before a mediator knowledgeable about the subject matter underlying the appeal.

(16) Shieldalloy Metallurgical Corporation
Name of Appellant or Respondent

(17) Dennis J. Krumholz
Name of Counsel of Record

(18) September 14, 2005
Date

(19) Dennis J. Krumholz
Signature of Counsel of Record

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Effective Date: September 15, 2008.
Expiration Date: June 13, 2013.

Summary of Public Comment and Agency Response:
No comments were received.

Federal Standards Statement

No Federal standards analysis is required because these amendments are not being adopted under the authority of, or in order to implement, comply with or participate in any program established under, Federal law or a State statute that incorporates or refers to Federal law, standards or requirements.

Full text of the adoption follows:

5:23-4.5 Municipal enforcing agencies—administration and enforcement

(a)-(i) (No change.)

(j) Conflict of interest:

1. No person employed by an enforcing agency as a construction or subcode official or as an inspector shall knowingly carry out any inspection or enforcement procedure with respect to any property or business in which he or she, or any close relative or household member, or his or her superior within the enforcing agency, or any close relative or household member of such superior, or any other public official or employee having any direct or indirect control over the funding or operations of the enforcing agency, or any household member of any such public official or employee, has an economic interest. For purposes of this paragraph, "close relative" shall mean and include a spouse, sibling, ancestor or descendant, or the spouse of any of them.

i.-ii. (No change.)

2. No person employed by an enforcing agency as a construction or subcode official, assistant to the construction or subcode official, trainee, inspector or plan reviewer, shall, whether directly or indirectly, be engaged in ownership of, or employment by, or contracting to provide goods or services to, any business or employment furnishing labor, materials, products or services for the construction, alteration or demolition of buildings or structures that is engaged in any such activity within any municipality in which he is so employed by an enforcing agency, or in any municipality adjacent to any municipality in which he is thus employed. For purposes of the prohibition set forth in this paragraph, it shall be immaterial whether the employment by the business, or the providing of goods and services to the business, occurred within the employing municipality or an adjacent municipality or occurred elsewhere.

3.-6. (No change.)

(k) (No change.)

5:23-5.25 Revocation of licenses and alternative sanctions

(a)-(b) (No change.)

(c) Conviction of a crime, or conviction of an offense in connection with one's performance as a licensed code enforcement official or inspector, or a determination by the Department that a licensee has engaged in conduct constituting a conflict of interest under N.J.A.C. 5:23-4.5(j)2, shall constitute grounds for revocation of a license.

(d)-(e) (No change.)

(a)

STATE PLANNING COMMISSION

State Planning Rules

Readoption: N.J.A.C. 5:85

Proposed: June 2, 2008 at 40 N.J.R. 2631(a).
Adopted: August 20, 2008 by State Planning Commission, Benjamin L. Spinelli, Esq., Secretary and Principal Executive Officer.
Filed: August 21, 2008 as R.2008 d.279, **without change.**

Authority: N.J.S.A. 52:18A-203.

Effective Date: August 21, 2008.
Expiration Date: August 21, 2013.

Summary of Public Comment and Agency Response:
No comments were received.

Federal Standards Statement

No Federal standards analysis is required because the rules readopted at N.J.A.C. 5:85 are not being readopted under the authority of, or in order to implement, comply with or participate in any program established under Federal law or a State statute that incorporates or refers to Federal law, standards or requirements.

Full text of the readopted rules can be found in the New Jersey Administrative Code at N.J.A.C. 5:85.

ENVIRONMENTAL PROTECTION

(b)

ENVIRONMENTAL REGULATION
DIVISION OF ENVIRONMENTAL SAFETY AND HEALTH
COMMISSION ON RADIATION PROTECTION

Radiation Protection Programs

Adopted Repeals: N.J.A.C. 7:28-3.5, 3.8, 3.11, 3.13, 4.19, 5.4, 7.5, 8.3, 8.4, 9, 10.4, 10.5, 10.9 and 11

Adopted New Rules: N.J.A.C. 7:28-2.13, 4.16, 12.10, 12.15, and 50 through 64

Adopted Repeals and New Rules: N.J.A.C. 7:28-6

Adopted Amendments: N.J.A.C. 7:28-1.1, 1.4, 1.5, 3.1, 3.2, 3.6, 3.10, 4.1 through 4.18, 5.1 through 5.3, 7.1 through 7.3, 8.1, 8.2, 10.6, 10.8, 12.2 through 12.5, 12.8 through 12.12, 12 Appendix A, 13.1, 13.2, 17.1 through 17.6, 17.8, 18.1, and 48.2

Proposed: May 19, 2008 at 40 N.J.R. 2309(a).
Adopted: August 20, 2008 by Lisa P. Jackson, Commissioner, Department of Environmental Protection and August 12, 2008 by the Commission on Radiation Protection, Julie K. Timins, M.D., Chair.
Filed: August 21, 2008 as R.2008 d.281, **with substantive and technical changes** not requiring additional public notice and comment (see N.J.A.C. 1:30-6.3).

Authority: N.J.S.A. 13:1B-1 et seq., 13:1D-1 et seq. and 26:2D-1 et seq.

DEP Docket Number: 04-08-04/637.

Effective Date: September 15, 2008.
Operative Date: Operative upon publication of notice in the New Jersey Register by the Department of Environmental Protection that the U.S. Nuclear Regulatory Commission and the State of New Jersey have entered into an Agreement for the State to regulate source, certain special nuclear, and by-product material.
Expiration Date: June 21, 2010.

The Department of Environmental Protection (Department) and the Commission on Radiation Protection (Commission) are adopting new rules, repeals and amendments to the Radiation Protection Programs' rules, N.J.A.C. 7:28, which new rules, repeals and amendments are part of New Jersey's becoming an Agreement State with the U.S. Nuclear Regulatory Commission (NRC).

New Jersey has a comprehensive radiation protection program encompassing x-ray machines, naturally occurring or accelerator produced radioactive materials (NARM), radon, clean up of radioactively contaminated sites, monitoring around nuclear power plants, emergency preparedness and response to radiological incidents including transportation accidents, and requirements for non-ionizing sources of radiation. Additionally, there are requirements for licensure and certification of people – radiological technologists, nuclear medicine

and/or emerging environmental issues at the county level and recommendations on how to address such issues.

(c) The Department shall review the county-wide environmental health assessment and improvement plan to identify delegated environmental activities to be undertaken by the certified local health agency in the upcoming grant cycle, and shall use this plan as a guide in apportioning grant monies to the certified local health agencies in accordance with (e) below.

(d) The Department shall conduct a grant conference each calendar year to discuss the Department's environmental priorities, as specified in the Strategic Plan and the NEPPS performance partnership agreement as well as emerging critical priorities established by the Department, which are relevant to the provision of environmental health services by certified local health agencies. Each certified local health agency shall have a representative attend this grant conference. Notice of the grant conference shall be made by means of a public notice published in the New Jersey Register.

(e) The Department shall apportion the monies available for grants among the certified local health agencies and establish delegated activities and output numbers based upon the following factors:

1. The extent to which the Department determines that the environmental activities to be funded are aligned with the Strategic Plan and the NEPPS performance partnership agreement and further the Department's goals and priorities as set forth therein;

2. The extent to which the Department determines that each county's recommendations regarding delegated activities to be undertaken, as identified in its county-wide environmental health assessment and improvement plan, are appropriate and serve to further the Department's goals and priorities as set forth in the Strategic Plan and NEPPS Performance Partnership Agreement;

3. The certified local health agency's record of satisfying its obligations as specified in the annual CEHA grant agreements executed with the Department; and

4. The certified local health agency's funding needs to undertake delegated environmental activities.

(a)

COMMISSION ON RADIATION PROTECTION

Soil Remediation Standards for Radioactive Materials

Adopted New Rules: N.J.A.C. 7:28-12

Proposed: July 6, 1999 at 31 N.J.R. 1723(a).

Adopted: June 21, 2000 by Robert C. Shinn, Jr., Commissioner, Department of Environmental Protection and the Commission on Radiation Protection, Dr. Henry Powsner, Chairman.

Filed: July 6, 2000 as R.2000 d.314, **with substantive and technical changes** not requiring additional public notice and comment (see N.J.A.C. 1:30-4.3).

Authority: N.J.S.A. 26:2D-1 et seq. and 58:10B-1 et seq.

DEP Docket Number: 11-99-06/697.

Effective Date: August 7, 2000.

Expiration Date: February 25, 2005

Summary of Public Comments and Department Responses:

The following companies, organizations, and/or agencies submitted written comments on the proposal.

1. CBS Corporation
2. US Environmental Protection Agency
3. US Nuclear Regulatory Agency
4. NL Industries
5. Shieldalloy Metallurgic Corporation
6. US Department of the Army—Corps of Engineers
7. New Jersey Environmental Federation representing 90,000 members
8. Heritage Minerals Inc.
9. Howmet Corporation
10. Zirconium Environmental Committee
11. Coalition Against Toxics
12. Public Service Electric & Gas
13. Oak Ridge Institute for Science and Education

A summary of the comments timely submitted and the Department's responses follows. The numbers in parenthesis after each comment corresponds to the commenter(s) listed above.

General

1. COMMENT: Five commenters expressed support for the Department's efforts to develop generically applicable standards that are easy to use and flexible, to assist persons responsible for planning and conducting site remediations. (2, 1, 6, 10, 3)

RESPONSE: The Department appreciates the commenter's support.

2. COMMENT: One commenter expressed opposition to the entire proposal in that it is in conflict with Federal standards, technically indefensible, and unduly burdensome with no corresponding benefit. (5) Two commenters could not support the proposal because it allows so much latitude for leaving untreated contaminants on site. (7, 11)

RESPONSE: The Department disagrees with the comments and addresses these points more specifically in the responses to Comment numbers 26, 37, 68 and 70.

3. COMMENT: One commenter expressed concern that no mention is made of "grandfathering" sites that are currently in the midst of decommissioning or will begin decommissioning prior to the implementation of the rules. For active sites, the State should recognize approved existing clean-up criteria that NRC licensees are working to meet. Applying new criteria in the middle of a cleanup project could have technical and legal consequences for all parties involved. The commenter would also like to see a reasonable phase-in period of at least one year established to prevent licensees who have committed a substantial investment in this process from ceasing clean-up operations due to changing clean-up criteria or significantly altering complex budgetary plans and schedules. (1)

RESPONSE: The Brownfield and Contaminated Site Remediation Act (Brownfield Act) at N.J.S.A. 58:10B-12 specifies that the Department may not require a change to a Department-approved workplan in order to compel a different remediation standard due to the fact that the established remediation standards have changed; however, the Department may compel a different remediation standard if the difference between the new remediation standard and the remediation standard approved in the workplan or other plan differs by an order of magnitude. The Department believes that because of this provision in the Brownfield Act, and because the Department has been using the proposed remediation standards for over two years, a one year phase-in period is not necessary.

4. COMMENT: One commenter (6) claimed that the combination of not having generic guidelines for accelerator produced radionuclides, the premix levels specified only to USS less than five, the fact that other radionuclides could be covered based on laws requiring clean up, the specifics of building construction related to radon, etc. means that the standards listed in N.J.A.C. 7:28-12.9 will have limited use. In most cases, the alternative approach outlined in N.J.A.C. 7:28-12.10 will be used. This will not be much different than the current practice. The stated parameter inputs Tables 6 and 7 may be a better way to approach this problem, that is, standardize the risk model parameters.

RESPONSE: Most of the contaminated properties in New Jersey contain only the naturally occurring radioactive materials. However, development of standards for nuclides not addressed in the proposed new rules will not cause undue burden on the owner because, as stated in the comment, the acceptable parameters and dose criteria are established in the Technical Basis document. This was not the case in past practice. Inclusion of the alternative standard approach (N.J.A.C. 7:28-12.10) is required as per legislative directive in the Brownfield and Contaminated Site Remediation Act (BCSRA).

5. COMMENT: One commenter stated that there does not appear to be any collaborating information presented for the Department's statement that "the minimum remediation standards for soil should result in less expensive remediations by eliminating the requirement for site-specific dose assessments." It might be true for a small site with limited quantities of contamination, but for a larger complex project with significant amounts of contamination it does not seem that it would be true. It would seem necessary to conduct the site-specific dose assessments to determine the potential exposures. (6)

RESPONSE: If site-specific dose assessments were necessary, the Department's spreadsheet, RaSoRS, could be used to easily develop the proper remediation standards. Parameters, such as the lot size, may be

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VIA FEDERAL EXPRESS

November 18, 2009

Ms. Nancy Wittenberg
Assistant Commissioner, Environmental Regulation
New Jersey Department of Environmental Protection
401 East State Street, 3rd Floor
PO Box 423
Trenton, NJ 08625-0423

Re: Request for Hardship Exemption or Stay
Shieldalloy Metallurgical Corporation

Dear Ms. Wittenberg:

This firm represents Shieldalloy Metallurgical Corporation ("Shieldalloy" or the "company") in connection with the decommissioning of its facility located in Newfield, New Jersey (the "Site"). The facility is subject to the terms and conditions of radioactive materials license No. SMB-743 issued by the Nuclear Regulatory Commission ("NRC"). We have received the October 8, 2009 letter of Patricia Gardner, Manager for the Bureau of Environmental Radiation within the New Jersey Department of Environmental Protection ("NJDEP" or "Department"), that rejects Shieldalloy's Decommissioning Plan ("DP") for the Site submitted to the NRC on August 28, 2009, as non-compliant with N.J.A.C. 7:28-58, including N.J.A.C. 7:28-12. The letter requires the company to prepare and submit a compliant decommissioning plan by January 31, 2010.

We write to request (1) a hardship exemption in accordance with N.J.A.C. 7:28-2.8, which would allow the Department to grant an exemption from certain requirements of N.J.A.C. 7:28-12 and thereby approve the DP, or (2) a stay of the requirement to prepare and submit a revised decommissioning plan compliant with N.J.A.C. 7:28-12 until the litigation commenced by Shieldalloy with respect to this matter in the federal and state courts is completed. See In re N.J.A.C. 7:28, Docket No. A-278-09 (Sup. Ct., App. Div.); Shieldalloy Metallurgical Corporation v. State of New Jersey, Department of Environmental Protection, and Mark N. Mauriello, in his Capacity as Acting Commissioner of the Department of Environmental Protection of the State of New Jersey, Docket No. 1:09-cv-04375-JEI-JS (U.S.D.C.); Shieldalloy Metallurgical Corporation v. United States Nuclear Regulatory Commission and the United States of America (D.C. Circuit, Docket No. 09-1268) (filed November 3, 2009).

BACKGROUND

Shieldalloy holds license no. SMB-743 ("License") for the Site, which was first issued by the Atomic Energy Commission ("AEC") in 1963 and renewed continuously since then by the AEC and the NRC, its successor agency. The License allows Shieldalloy to possess radioactive "source material" (i.e., uranium and thorium) and to plan the decommissioning of the Site. Source material was used by Shieldalloy at the Site since the 1950s in manufacturing operations

involving the processing of pyrochlore, an ore containing greater than 0.05% by weight of natural uranium and thorium. These manufacturing operations, which ceased in 2001, produced various radioactive by-products, including "slag" and baghouse dust that also contain uranium and thorium. These left-over source material remain in the Storage Yard, an approximately 12-acre portion of the 68-acre Site that has been designated a radiologically restricted area.

Shieldalloy advised the NRC in 1992 that its plan to decommission the Site would consist of permanent in-situ capping of slag and baghouse dust in the Storage Yard. This method is permitted by NRC regulations and guidelines currently in effect because it is safe and reliable. The company submitted a Conceptual Decommissioning Plan to NRC in 1993, providing more details on the in-situ capping approach. Shieldalloy's plan to decommission the Site using in-situ capping also was an element of the Environmental Settlement Agreement dated December 27, 1996, among Shieldalloy, NRC, NJDEP and others ("Environmental Settlement Agreement") that enabled the company to emerge from bankruptcy in 1997. Since approximately 2000, Shieldalloy has been working with the NRC to obtain approval of its DP for the Site, and it filed revisions to the plan in 2005, 2006 and 2009. The NJDEP has been aware of and has participated in the NRC process to review Shieldalloy's decommissioning plans for nearly two decades.

Shieldalloy submitted Revision (Rev.) 1b of its DP to the NRC on August 28, 2009, which describes in detail the company's plan to decommission the Site.

Shieldalloy proposes to consolidate all radioactively-contaminated materials in a designated, isolated 12-acre portion of the Site (the Storage Yard). DP Rev. 1b § 8.3. The consolidated materials will be shaped, graded, and covered with a seven-layer engineered barrier that provides a substantial and highly durable resistance to erosion, external intrusion and water infiltration. This permanent engineered barrier will last for at least one thousand years, even without maintenance or repair. DP Rev. 1b § 8.3.1. Shieldalloy also has proposed to fully fund the long term management, maintenance, monitoring, repair and reporting for this 1,000 year period. DP Rev. 1b § 15.3. The remaining 56 acres of the Site will be released for unrestricted use in accordance with NRC standards and are expected to be redeveloped for industrial use. DP Rev. 1b §§ 4.4, 7.1.1.

Shieldalloy's detailed evaluation set forth in the DP demonstrates that the engineered barrier will remain protective of public health and safety and the environment for at least 1,000 years, as required by federal law. The DP also demonstrates that the excavation and removal of the source material -- to the only facility in the United States that may accept it, owned by Energy*Solutions* in Utah -- is less protective of the public health and safety than capping the material in place. Excavation and removal also would result in unnecessary radiation exposure to workers and members of the general public contrary to N.J.S.A. 26:2D-10. To date, the company has spent thousands of man-hours and approximately $3 million to evaluate and design its plan to decommission the Site.

Shieldalloy is convinced that its in-situ capping plan presents the best decommissioning alternative, by far, to ensure public health and safety.

Following the request by the State of New Jersey to NRC for "Agreement State" status, the Department advised Shieldalloy in December 2008 that it objected to the Company's in-situ capping plan. New Jersey became an Agreement State on September 30, 2009, having entered into an agreement with NRC to obtain regulatory authority over most NRC-licensed facilities in New Jersey, including the Site. On October 8, 2009, eight days after it assumed NRC's regulatory authority, the NJDEP issued a letter formally rejecting Rev. 1b of the DP and requiring the company to prepare and submit a new decommissioning plan consistent with the Department's regulations at N.J.A.C. 7:28-58 and -12.

Shieldalloy recently commenced two litigations in New Jersey to address the dispute between Shieldalloy and NJDEP over decommissioning the Site. The company is challenging NJDEP's Radiation Protection Program rules in the matter captioned In re NJAC 7:28. It also has brought an action in federal court to enjoin the Department from requiring Shieldalloy to excavate and remove the source material from the Site on the basis that the Environmental Settlement Agreement and other applicable law require the NJDEP to allow Shieldalloy's proposed in-situ capping. Shieldalloy Metallurgical Corporation v. State of New Jersey, Department of Environmental Protection, et al. Finally, the Company has requested that the NRC stay the effective date of its transfer of regulatory

authority over its facility to the State of New Jersey until judicial review can be obtained of these matters, and it has filed a Petition in the United States Court of Appeal for the District of Columbia Circuit seeking review of the NRC's decision to enter into the agreement with New Jersey. Shieldalloy Metallurgical Corporation v. United States Nuclear Regulatory Commission and the United States of America. These proceedings have just begun; briefing and/or trial on the substantive issues remain to be addressed.

SHIELDALLOY SATISFIES THE REGULATORY REQUIREMENT FOR A HARDSHIP EXEMPTION

Shieldalloy requests that the Department grant a "hardship exemption" from certain requirements of the Radiation Protection Rules, N.J.A.C. 7:28 (Rules).[1] The granting of this exemption would allow the NJDEP to approve the company's DP Rev. 1b. As demonstrated below, Shieldalloy is able to fulfill the requirements of the regulatory exemption, and its plan to decommission the Site is protective of public health and safety and the environment. In the alternative, if an exemption is not granted, and if the Department orders Shieldalloy to remove the source material from the Site, the company is likely to be forced into

[1] Shieldalloy's request for a regulatory exemption is made without prejudice to its right to challenge the validity of the Rules and their applicability to the Shieldalloy Site, and to its pending challenge to the transfer of authority over the Site from the NRC to the State of New Jersey.

bankruptcy and/or liquidation and be unable to decommission the Site.

Section 2.8, Special Exemptions, of the Rules provides as follows:

> The Department, upon application and showing of hardship or compelling need, with the approval of the Commission, may grant an exemption from any requirement of [N.J.A.C. 7:28] should it determine that such exemption will not result in any exposure to radiation in excess of the limits permitted by Subchapter 6, Standards for Protection Against Radiation.

The requirements of Section 2.8 are clearly satisfied in this instance.

A. Hardship to Shieldalloy would result from strict compliance with N.J.A.C. 7:28-12.

A genuine hardship would be imposed upon Shieldalloy if it were required to decommission the Site in full compliance with the Rules. In DP Rev. 1b, Shieldalloy has analyzed and presented the cost of several alternatives in decommissioning the Site. The cost to implement Shieldalloy's decommissioning plan is on the order of $14.7 million. DP Rev. 1b, Table 17.2. By contrast, the cost to remove the radioactive materials from the site and dispose of them in Utah as would be required by the Rules is in excess of $70 million.[2] DP Rev. 1b,

[2] We are aware that the State of New Jersey recently asserted to the NRC that removal of the materials might be completed for $45 million. Even if the difference in cost were material to the ability of Shieldalloy to implement this remedy -- which it is not -- the Energy*Solutions*' estimate forming the basis of the State's assertion acknowledges that it does not include all (footnote continued...)

Table 17.3.

Although Shieldalloy's DP Rev. 1b complies with NRC regulations and guidance and is protective of public health and safety and the environment, certain requirements of N.J.A.C. 7:28-12 effectively prohibit Shieldalloy's decommissioning plan and require the excavation and removal of the radioactive materials. Shieldalloy requests an exemption from those Rules that would prohibit the company's in-situ capping of slag and baghouse dust in the Storage Yard, as well as from the Rules for establishing specific cleanup standards that render Shieldalloy's plan to decommission and release the remainder of the Site noncompliant.

The requirements of N.J.A.C. 7:28-12 that preclude acceptance of Rev. 1b of the DP, and which Shieldalloy requests be waived, include the following:

- Use of the "all controls fail" exposure scenario, N.J.A.C. 7:28-12.11(e). In effect, this regulation requires an evaluation of the effectiveness of Shieldalloy's DP in protecting public health and safety in the event of a total and instantaneous failure of the proposed remedy. Put another way, the NJDEP requires use of the assumption that all engineering and institutional controls have completely disappeared, including the presence

costs to decommission the Site or account for the cost-contingency factor required by the (footnote continued...)

of the permanent engineered barrier. As noted, Shieldalloy's proposed engineered barrier will be effective for more than 1,000 years, even without maintenance, and DP Rev. 1b includes funding and licensing provisions for monitoring, maintenance, repair and reporting for at least this length of time. The NRC mandates use of more reasonable exposure scenarios, for example allowing consideration of partial degradation rather than a complete failure of the engineered barrier and other controls. Shieldalloy's DP satisfies the requirements of this scenario and of all other scenarios postulated by NRC. Requiring use of the Department's "all controls fail" scenario is not reasonable under these circumstances.

- Consideration of "peak dose" if it may occur more than 1,000 years in the future. N.J.A.C. 7:28-12.11(f)(2)(iii). Requiring an evaluation of potential radiological conditions which may be present more than 1,000 years from the present -- and requiring a remedy to be developed on the basis of that analysis -- exceeds all standards of reasonableness. 1,000 years is itself an extraordinarily conservative planning horizon, and Shieldalloy has demonstrated that its proposed decommissioning plan will be effective and provide adequate protection for at least that length of time, and probably

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NRC.

considerably longer.

- Use of isotope-specific soil cleanup standards for each radionuclide, based on allowed Derived Concentration Guidance Levels ("DCGLs") above background. See N.J.A.C. 7:28-12.9. NRC and most other states rely upon "total effective dose equivalent," or TEDE, as the primary measure and limitation on radiological exposures, and Shieldalloy's DP Rev. 1b complies with these limitations. However, the NJDEP additionally requires compliance with specific DCGLs for each radionuclide in soil that become more stringent with depth and proximity to bedrock sources of background radiation. Compliance with these NJDEP limits at the Site is essentially impossible because the material in question is naturally occurring uranium and thorium and relatively high background levels of those radionuclides also are present at the Site. Since these radionuclides are ubiquitously present in the natural environment, there is great difficulty distinguishing among radioactivity resulting from natural background, source material operations and general industrial operations and infrastructure. Further, uranium and thorium have a host of daughter isotopes (progeny), which are present at the Site from natural and man-made sources. As a result, all of the isotopes listed in the NJDEP tables

must be evaluated using NJDEP's conservative regulatory formula, which gives rise to DCGLs for each isotope that are so low they are comparable to and indistinguishable from variations in background sources, whether natural or man-made. The impossibility of complying with these standards in the Storage Yard and in the remainder of the Site represents an additional hardship justifying Shieldalloy's request for an exemption from the Rules.

- Use of specific limits for surface water and ground water discharges. See N.J.A.C. 7:28-12.11. Contrary to the approach of the NRC and other states, the NJDEP requires that the potential radiation exposures be evaluated and specifically limited for each environmental medium -- soil, ground water and surface water -- rather than for total potential exposure across all media. These New Jersey-specific limitations are not necessary to protect public health or the environment and, as described above, they are particularly difficult to meet at the Site due to the fact that the radioactivity in question is present in the natural background.

- Limitations on the development of alternative exposure scenarios and standards. See N.J.A.C. 7:28-12.11. The NJDEP's Rules are based upon

use of overly conservative exposure scenarios, and they significantly limit the use of alternative parameters and exposure scenarios. The required use of these scenarios conflicts with the NRC's rules and guidance and those of other states, which are protective of public health and the environment while allowing use of more reasonable alternatives and exposure scenarios to determine potential radiation dose (e.g., dose to the average member of a critical exposed group). See, e.g., 10 C.F.R. 20.1402, 20.1403(b). The limitations on the development of alternatives make it impossible to comply with the Rules at the Site because of the significant natural background radiation. In addition, during the dose assessment, any DCGLs that are derived from the use of a 15 millirem dose limit and the specific input parameters required by NJDEP are too low to be detectable at the Site with any scientific certainty. We note, too, that these restrictions on the development of alternatives conflict with the Brownfields and Contaminated Site Remediation Act, one of the statutes upon which the agency relies for authority in promulgating the Rules; specifically, the use of site-specific risk assessment to develop soil cleanup standards. See N.J.S.A. 58:10B-12.f(1).

- Other requirements of N.J.A.C. 7:28 also may conflict with aspects of

Shieldalloy's DP Rev. 1b; we will provide additional information to the Department if it is amenable to further considering this exemption.

The result of applying the requirements of N.J.A.C. 7:28-12 to the Site is that the in-situ capping method may not be used to cap the Storage Yard, and the remainder of the Site may not be released for redevelopment for industrial use as proposed in DP Rev. 1b. Instead, the source material at the Site will need to be excavated and removed at enormous cost to be similarly capped at another location in Utah; the remainder of the Site also will have to be decontaminated to satisfy standards that are impossible to meet. The approach required by the NJDEP Rules is significantly more stringent than, and is at odds with, the views of the NRC, most other states and the scientific community, and provides a lesser level of public safety than does Shieldalloy's proposed plan. The approach is also well beyond the authority of the New Jersey Radiation Protection Act to address "unnecessary radiation." Excavation and removal of the source material is not necessary to protect public health and the environment and, in fact, Shieldalloy has demonstrated that it is less protective than capping the source material in place.

Shieldalloy is financially able to absorb the cost to implement the in-situ capping method and the release of the Site, as described in DP Rev. 1b as

approximately $14 million. The company cannot, however, defray the $70 million cost of removal of the materials from the Site that would be required by N.J.A.C. 7:28-12. As a result, were the company required to implement the excavation and removal alternative it would suffer catastrophic business injury; Shieldalloy would most likely be forced to file a petition for bankruptcy, potentially liquidate and be unable to decommission the Site. Recall, as noted above, that the company already filed for bankruptcy protection once and was able to emerge only as a result of the agreement by all parties -- including the NRC and New Jersey -- to set aside funds to decommission the Site using in-situ capping, as reflected in the Environmental Settlement Agreement. Likewise, compliance with the specific cleanup standards contemplated by the Rules, even if this were possible, would be extraordinarily costly.

In sum, the NJDEP's requirement to decommission the Site in full compliance with N.J.A.C. 7:28-12 will give rise to significant hardship to Shieldalloy, and there is a compelling need for the exemption. See N.J.A.C. 7:28-2.8. An exemption from these requirements, on the other hand, will enable Shieldalloy to implement the in-situ decommissioning approach presented in DP Rev. 1b and to release the remainder of the Site for industrial redevelopment.

B. Shieldalloy's DP Rev. 1b complies with the radiation exposure limits set forth in Subchapter 6 of the Rules.

Shieldalloy's in-situ decommissioning plan complies with the dose limits

contained at N.J.A.C. 7:28-6, the second prong of the hardship exemption. With several omissions and amendments, Subchapter 6 of the Rules incorporates by reference substantially all of NRC regulations in 10 C.F.R. Part 20, including a number of the NRC's dose limits. The most stringent limit incorporated into the regulations provides that the maximum allowable radiation exposure to the general public is 100 millirem (mrem) total effective dose equivalent (TEDE).

DP Rev. 1b demonstrates that the level of protection required by Subchapter 6 is achieved by Shieldalloy's proposed in-situ capping plan. Even in an overly conservative worst-case scenario, Shieldalloy's in-situ capping of the radioactive material results in potential radiation exposure that is below 100 mrem TEDE. In this highly unlikely scenario, Shieldalloy's seven-layer engineered barrier is degraded as a result of the intentional breaching of the cap; a hypothetical subsistence farming family lives next to the breach in the cap; it derives its drinking water from beneath the source material and eats only produce and animals grown on the Site. As described in DP Rev. 1b, this highly unlikely scenario results in an exposure of 86 mrem TEDE, which is below the applicable dose limit of Subchapter 6.

More realistic exposure scenarios evaluated in DP Rev. 1b show potential dose exposures that are lower by many orders of magnitude than the limits of Subchapter 6: 0.0000003 mrem TEDE for a maintenance worker, 0.000003 to 2 mrem TEDE for a recreational hunter, 0.0000004 to 1 mrem TEDE for an

occasional trespasser, and less than 25 millirem TEDE for an industrial worker on the Site. See DP Rev. 1b § 5.3 and Appendix 19.11.

In summary, DP Rev. 1b demonstrates that it will meet the applicable dose limits incorporated by reference in Subchapter 6. Under all reasonable exposure scenarios within a 1,000 year planning horizon, the plan will result in no measurable radiation dose to any member of the public. Moreover, the in-situ capping method described in DP Rev. 1b is far safer and produces fewer potential health and environmental impacts than any other option for decommissioning the Newfield facility.

Finally, as described in Chapter 7 of DP Rev. 1b, were excavation and removal of source material implemented as would be required by N.J.A.C. 7:28-12, the processing and packaging of the materials for shipment to the disposal site in Utah would result in direct radiation exposure and inhalation of airborne radioactivity by Shieldalloy employees, contractors, decommissioning workers, and members of the public. DP Rev 1b § 7.3.4 – 7.3.5. The public and decommissioning workers also would be exposed to radiation during the transportation of the materials to the Utah disposal site and during its ultimate disposal there. DP Rev 1b § 7.3.4.2. The total doses to workers and the public resulting from this removal and off-site disposal process would be much greater than those that would result from implementation of Shieldalloy's proposed in-situ capping. DP Rev 1b § 7.3.5. Indeed, this approach would give rise to

"unnecessary radiation" exposures prohibited by the Radiation Protection Act.

Based on the foregoing, and on the information contained in DP Rev. 1b, the NJDEP should grant a hardship exemption to Shieldalloy and allow the company to decommission its facility in accordance with the provisions of DP Rev. 1b.

ALTERNATIVELY, SHIELDALLOY'S REQUEST FOR A STAY SHOULD BE GRANTED

Shieldalloy requests in the alternative that the Department issue a stay of its October 8, 2009 requirement that the company submit a revised decommissioning plan in accordance with the Rules by January 31, 2010.[3] As noted above, several litigations are underway to preserve Shieldalloy's ability to decommission the Site in accordance with DP Rev. 1b, including procedural and substantive challenges to the very regulations that the NJDEP is seeking to enforce against Shieldalloy by requiring it submit a revised decommissioning plan. These litigations have commenced only recently, and the substantive issues have yet to be joined.

[3] Even if Shieldalloy were capable of funding the decommissioning plan required by NJDEP's Rules, the three-month period allowed by the Department to prepare and submit a plan is wholly inadequate for the task. By comparison, the NRC regulations at 10 C.F.R. §40.42(d) (footnote continued...)

As explained above, Shieldalloy is incapable of funding the decommissioning of the Site as would be required by the Rules. It also would be manifestly unfair and a waste of resources to require the company to prepare and submit a decommissioning plan that commits the company to conform with the requirements of N.J.A.C. 7:28 while it is appealing the validity of this very rule.

If a stay is not granted, Shieldalloy will suffer substantial harm. If the company is required to decommission the facility in accordance with the requirements of N.J.A.C. 7:28, it likely will be forced into bankruptcy and, perhaps, to liquidate. See Saturn v. General Motors Corp., 2009 WL 1545559 (D.N.J. May 29, 2009) (finding that destruction of a business is irreparable harm). Expending limited resources to prepare a decommissioning plan that the company cannot implement is unfair and wasteful, particularly if its challenges to the Rules are successful.

It also is possible that Shieldalloy would become unfairly subject to penalty if it were to refuse to prepare the revised DP in accordance with the challenged regulations. See, e.g., In re Kimber Petroleum, 110 N.J. 69, 80 (1988) ("[d]ue process standards arguably call for a right to challenge the validity of a legislative or administrative order without facing the possibility that one will incur a greater penalty if such challenge is unsuccessful than the loss resulting from such an order

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allow licensees twelve months (subject to potential extension) for the preparation and submittal (footnote continued...)

if left unchallenged.") (citing United States v. Pacific Coast European Conference, 451 F.2d 712, 717 (9th Cir. 1971) (under due process, a "constitutional tolling principle" prevents one from being forced to pay a statutory penalty for noncompliance with an act during the time it is being tested in good faith)). Shieldalloy cannot in good faith submit a decommissioning plan that it cannot perform.

The issue of the proper decommissioning plan for the Site was addressed during Shieldalloy's bankruptcy proceeding in the 1990s. As noted above, the company was able to emerge from bankruptcy in part as a result of the understanding that an in-situ capping method would be employed to decommission the Site. At the time, the cost of this decommissioning was estimated to be $5 million. If excavation and removal of the material had been required during the bankruptcy, with at least an order of magnitude higher cost (e.g., $50 million), Shieldalloy almost certainly would have liquidated rather than reorganize. It is unjust and unlawful to require a change in the decommissioning approach now; it also may well be futile in the event the company is economically destroyed as a result.

Granting the stay for the period of time that the litigation is ongoing will have no adverse impact upon public health or the environment. The source

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of a proposed decommissioning plan.

material at the Newfield site has been safely stored in its current location and condition for more than thirty years without any engineered barrier, with the approval of the NRC, and without any adverse radiological or other consequences resulting. Indeed, the NRC recently determined that "[b]ased upon the information provided to us we have no reason to conclude that there are ongoing violations of NRC health and safety standards at the Newfield site." NRC Memorandum and Order, CLI-09-01, 69 NRC 1, 3 (2009).

The granting of a stay similarly will have no adverse effect upon the integrity of the regulatory process. During the time it takes to adjudicate Shieldalloy's appeals, it is unlikely that any other company will be faced with the need to decommission a similar source material facility in accordance with the Rules. Indeed, the Department has acknowledged that the Site is the only facility pending decommissioning that would be affected by several of these regulations. 40 N.J.R. 5199 (Sept. 15, 2008).

The substantial harm that would result to Shieldalloy were it obligated to submit and implement a decommissioning plan that complies with Subchapter 12, the lack of adverse impact to public health and the environment if compliance were to remain in abeyance during the pendency of existing litigation, and the balance of equities and hardships among the parties all favor maintaining the status quo until the company's judicial challenges have been adjudicated. Accordingly, we ask the Department to stay the requirement to submit a revised

decommissioning plan.

In conclusion, on behalf of Shieldalloy we request that the Department grant a hardship exemption in accordance with N.J.A.C. 7:28-2.8 to allow the NJDEP to approve the decommissioning plan set forth in DP Rev. 1b. Alternatively, we seek a stay of the requirement to submit a revised decommissioning plan until the litigations commenced by Shieldalloy with respect to these matters are finally adjudicated.

Very truly yours,

Dennis J. Krumholz

cc: Kenneth W. Elwell, Deputy Attorney General, State of New Jersey
Shieldalloy Metallurgical Corporation
Pillsbury Winthrop Shaw Pittman LLP

3990289

New Jersey Judiciary

Superior Court - Appellate Division

NOTICE OF APPEAL

Type or clearly print all information. Attach additional sheets if necessary.

ATTORNEY / LAW FIRM / PRO SE LITIGANT (2)

TITLE IN FULL (AS CAPTIONED BELOW): (1)
Shieldalloy Metallurgical Corporation v. State of New Jersey, Department of Environmental Protection

NAME
Dennis J. Krumholz
Riker Danzig Scherer Hyland & Perretti LLP

STREET ADDRESS
Headquarters Plaza, One Speedwell Avenue

CITY	STATE	ZIP	PHONE NUMBER
Morristown	NJ	07962	973.538.0800

EMAIL ADDRESS
dkrumholz@riker.com

ON APPEAL FROM

TRIAL COURT JUDGE (3)	TRIAL COURT OR STATE AGENCY (4)	TRIAL COURT OR AGENCY NUMBER (5)
	Department of Environmental Protection (DEP)	

Notice is hereby given that (6) Shieldalloy Metallurgical Corporation appeals to the Appellate

(7) Division from a ☐ Judgment or ☐ Order entered on _____ in the ☐ Civil ☐ Criminal or ☐ Family Part of the Superior Court or from a ☒ State Agency decision entered on October 8, 2009.

(8) If not appealing the entire judgment, order or agency decision, specify what parts or paragraphs are being appealed.

(9) Have all issues, as to all parties in this action, before the trial court or agency been disposed of? (In consolidated actions, all issues as to all parties in all actions must have been disposed of.) N/A ☐ Yes ☐ No

If not, has the order been properly certified as final pursuant to R. 4:42-2? ☐ Yes ☐ No

For criminal, quasi-criminal and juvenile actions only:

(10A) Give a concise statement of the offense and the judgment including date entered and any sentence or disposition imposed:

(10B) This appeal is from a ☐ conviction ☐ post judgment motion ☐ post-conviction relief.

If post-conviction relief, is it the ☐ 1st ☐ 2nd ☐ other _____ specify

(10C) Is defendant incarcerated? ☐ Yes ☐ No

Was bail granted or the sentence or disposition stayed? ☐ Yes ☐ No

(10D) If in custody, name the place of confinement:

Defendant was represented below by:

☐ Public Defender ☐ self ☐ private counsel _____ specify

Revised effective 9/01/2008

Notice of appeal and attached case information statement have been served where applicable on the following:

	Name	Date of Service
Trial Court Judge		
Trial Court Division Manager		
Tax Court Administrator		
State Agency	Dept. of Environmental Protection	November 25, 2009
Attorney General or Attorney for other Governmental body pursuant to R. 2:5-1(a), (e) or (h)	Dept. of Law and Public Safety, Division of Law	November 25, 2009

Other parties in this action:

Name and Designation	Attorney Name, Address and Telephone No.	Date of Service

(12) Attached transcript request form has been served where applicable on the following:

	Name	Date of Service	Amount of Deposit
Trial Court Transcript Office			
Court Reporter (if applicable)			
Supervisor of Court Reporters			
Clerk of the Tax Court			
State Agency			

(13) Exempt from submitting the transcript request form due to the following:

☒ No verbatim record.

☐ Transcript in possession of attorney or pro se litigant (four copies of the transcript must be submitted along with an electronic copy).
List the date(s) of the trial or hearing:

☐ Motion for abbreviation of transcript filed with the court or agency below. Attach copy.

☐ Motion for free transcript filed with the court below. Attach copy.

I certify that the foregoing statements are true to the best of my knowledge, information and belief.

I also certify that, unless exempt, the filing fee required by N.J.S.A. 22A:2 has been paid.

(14) November 25, 2009 (15) Dennis J. Kuhnel
DATE SIGNATURE OF ATTORNEY OR PRO SE LITIGANT

Page 2 of 2

New Jersey Judiciary

Superior Court - Appellate Division

CIVIL CASE INFORMATION STATEMENT

Please type or clearly print all information.

TITLE IN FULL (1)	TRIAL COURT OR AGENCY DOCKET NUMBER (2)
Shieldalloy Metallurgical Corporation v. State of New Jersey, Department of Environmental Protection	N/A

- Attach additional sheets as necessary for any information below.

(3) APPELLANT'S ATTORNEY EMAIL ADDRESS: dkrumholz@riker.com

☐ PLAINTIFF ☐ DEFENDANT ☒ OTHER (SPECIFY) Appellant

NAME	CLIENT
Dennis J. Krumholz, Riker Danzig Scherer Hyland & Perretti LLP	Shieldalloy Metallurgical Corporation

STREET ADDRESS	CITY	STATE	ZIP	TELEPHONE NUMBER
Headquarters Plaza, One Speedwell Avenue	Morristown	NJ	07962	973.538.0800

(4) RESPONDENT'S ATTORNEY * EMAIL ADDRESS:

NAME	CLIENT
New Jersey Dept. of Law and Public Safety, Division of Law	New Jersey Dept. of Environmental Protection

STREET ADDRESS	CITY	STATE	ZIP	TELEPHONE NUMBER
25 Market Street, P.O. Box 112	Trenton	NJ	08625	609.984.3900

* Indicate which parties, if any, did not participate below or were no longer parties to the action at the time of entry of the judgment or decision being appealed.

(5) GIVE DATE AND SUMMARY OF JUDGMENT, ORDER, OR DECISION BEING APPEALED AND ATTACH A COPY:

By letter dated October 8, 2009 and received October 13, 2009 (attached hereto), the New Jersey Department of Environmental Protection ("NJDEP") determined that the Decommissioning Plan Revision 1b ("DP Rev. 1b") submitted by Shieldalloy Metallurgical Corporation ("Shieldalloy") to the Nuclear Regulatory Commission ("NRC") on August 28, 2009, does not comply with NJDEP's regulations and required submission of a revised decommissioning plan by January 31, 2010.

(6) Are there any claims against any party below, either in this or a consolidated action, which have not been disposed of, including counterclaims, cross-claims, third party claims and applications for counsel fees? ☐ Yes ☒ No

If so, has the order been properly certified as final pursuant to R. 4:42-2? (If not, leave to appeal must be sought. R. 2:2-4, 2:5-6.) ☐ Yes ☐ No

(If the order has been certified, attach, together with a copy of the order, a copy of the complaint or any other relevant pleadings and a brief explanation as to why the order qualified for certification pursuant to R. 4:42-2.)

(7) Is the validity of a statute, regulation, executive order, franchise or constitutional provision of this State being questioned? (R. 2:5-1(h)) ☒ Yes ☐ No

(8) GIVE A BRIEF STATEMENT OF THE FACTS AND PROCEDURAL HISTORY:

Shieldalloy holds license no. SMB-743 ("License") for its facility in Newfield, New Jersey ("Site"). The License was first issued by the Atomic Energy Commission ("AEC") in 1963 and renewed continuously since then by the AEC and the NRC. The License currently allows Shieldalloy to possess radioactive "source material" (i.e., uranium and thorium), which the company used in former manufacturing conducted on the Site, and to plan the decommissioning of the Site. On August 28, 2009, Shieldalloy submitted DP Rev. 1b for the Site to the NRC in accordance with federal requirements. On September 23, 2009, the NRC and State of New Jersey entered into an agreement, allowing New Jersey to become an "Agreement State" and transferring regulatory authority over Shieldalloy's License to the NJDEP. By letter dated October 8, 2009, eight days after becoming an "Agreement State," the NJDEP rejected Shieldalloy's DP Rev. 1b, stating that the plan does not comply with New Jersey requirements at N.J.A.C. 7:28, and it required the company to submit a revised decommissioning plan by January 31, 2010.

In separate actions, Shieldalloy is challenging the rules and standards adopted by the NJDEP Commissioner and by the Commission on Radiation Protection, including standards for decommissioning facilities possessing licensed radioactive material, In re: N.J.A.C. 7:28, A-000278-09T2; and the NRC's decision to enter into an agreement with New Jersey to transfer its regulatory jurisdiction over the Shieldalloy Site to the NJDEP. Shieldalloy Metallurgical Corporation v. United States Nuclear Regulatory Commission and the United States of America (D.C. Circuit, Docket No. 09-1268). Shieldalloy also has brought an action seeking to enforce the Environmental Settlement Agreement entered into among the NJDEP, NRC, and the company dated March 26, 1997. Shieldalloy Metallurgical Corporation v. State of New Jersey, Department of Environmental Protection, and Mark N. Mauriello, in his Capacity as Acting Commissioner of the Department of Environmental Protection of the State of New Jersey, Docket No. 1:09-cv-04375-EI-JS (U.S.D.C.).

TO THE EXTENT POSSIBLE, LIST THE PROPOSED ISSUES TO BE RAISED ON THE APPEAL AS THEY WILL BE DESCRIBED IN THE APPROPRIATE POINT HEADINGS PURSUANT TO R. 2:6-2(a)(5). (Appellant or cross-appellant only.):

I. NJDEP's rejection of Shieldalloy's DP Rev. 1b is wrongful and invalid because NJDEP did not afford Shieldalloy an opportunity to be heard and thereby deprived Shieldalloy of administrative due process.

II. NJDEP's rejection of Shieldalloy's DP Rev. 1b is unauthorized and invalid because the basis of its rejection of the decommissioning plan are regulations that are arbitrary, capricious, unreasonable, ultra vires, and otherwise unlawful and invalid.

A. The Radiation Protection Programs rules, N.J.A.C. 7:28 ("Rules"), are invalid because they were not adopted in accordance with the requirements of the State Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq. ("APA"), including those for federal, regulatory and fiscal impact analyses. Significant changes made upon adoption of the Rules, as contrasted with the rule proposal, require further publication and opportunity for public comment before the Rules may be adopted. Other aspects of the Rules and adoption also violate the APA.

B. The requirement of the Rules that, upon commencing the decommissioning of a facility, a licensee must address the potential impacts of radiation that theoretically may occur thousands, hundreds of thousands and even millions of years into the future is arbitrary and capricious and without basis in fact or law.

C. The Rules are ultra vires and arbitrary and capricious because they exceed the scope of the Radiation Protection Act, N.J.S.A. 26:2D et seq., which only authorizes regulation of "unnecessary radiation." One effect of the Rules is to require low level radioactive materials to be excavated and transported off-site for disposal; this practice will expose the public, agriculture and the environment to unnecessary radiation.

D. NJDEP relies upon the Brownfields and Contaminated Site Remediation Act, N.J.S.A. 58:10B-1 et seq. ("Brownfields Act"), for authority to develop the cleanup standards set forth in the Rules; however, the Brownfields Act does not provide any such authority. For example, it does not authorize cleanup standards for radiation. It also limits NJDEP's authority to the development of a cleanup standard for individual hazardous substances, not for the cleanup standards in the Rules which are based upon the cumulative radiological effects of radionuclides.

E In the alternative, if the Brownfields Act does authorize development of cleanup standards for radiation and radionuclides, the standards set forth in the Rules are ultra vires, arbitrary and capricious because they do not comply with the requirements to develop cleanup standards as prescribed by the Brownfields Act.

F. Contrary to the Federal and State Constitution and the APA, the Rules amount to special legislation or rulemaking directed solely at Shieldalloy, and they deny the company equal protection of the law.

(10) IF YOU ARE APPEALING FROM A JUDGMENT ENTERED BY A TRIAL JUDGE SITTING WITHOUT A JURY OR FROM AN ORDER OF THE TRIAL COURT, COMPLETE THE FOLLOWING:

1. Did the trial judge issue oral findings or an opinion? If so, on what date? _____ ☐ Yes ☐ No
2. Did the trial judge issue written findings or an opinion? If so, on what date? _____ ☐ Yes ☐ No
3. Will the trial judge be filing a statement of an opinion pursuant to R. 2:5-1(b)? ☐ Yes ☐ No

Caution: Before you indicate that there was neither findings nor an opinion, you should inquire of the trial judge to determine whether findings or an opinion was placed on the record out of counsel's presence or whether the judge will be filing a statement or opinion pursuant to R. 2:5-1(b).

DATE OF YOUR INQUIRY: _____

1. IS THERE ANY APPEAL NOW PENDING OR ABOUT TO BE BROUGHT BEFORE THIS COURT WHICH:

(11) (A) Arises from substantially the same case or controversy as this appeal? ☒ Yes ☐ No
(12) (B) Involves an issue that is substantially the same, similar or related to an issue in this appeal? ☒ Yes ☐ No
(13) 2. WAS THERE ANY PRIOR APPEAL INVOLVING THIS CASE OR CONTROVERSY: ☐ Yes ☒ No
(14) IF THE ANSWER TO EITHER 1 OR 2 ABOVE IS YES, STATE:

Case Name: In re: N.J.A.C. 7:28

Appellate Division Docket Number: A-000278-09T2

Civil appeals are screened for submission to the Civil Appeals Settlement Program (CASP) to determine their potential for settlement or, in the alternative, a simplification of the issues and any other matters that may aid in the disposition or handling of the appeal. Please consider these when responding to the following question. A negative response will not necessarily rule out the scheduling of a preargument conference.

(15) State whether you think this case may benefit from a CASP conference. ☒ Yes ☐ No
Explain your answer: Appellant is amenable to participation in a settlement conference before a mediator knowledgeable about the subject matter underlying the appeal.

(16) Shieldalloy Metallurgical Corporation
Name of Appellant or Respondent

(17) Dennis J. Krumholz
Name of Counsel of Record
(or your name if not represented by counsel)

(18) November 25, 2009
Date

(19) Dennis J. Krumholz
Signature of Counsel of Record

4a

ORDER ON MOTION

A-1481-09

SHIELDALLOY METALLURGICAL CORPORATION
VS
STATE OF NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

SUPERIOR COURT OF NEW JERSEY
APPELLATE DIVISION
DOCKET NO. A -001481-09T2
MOTION NO. M -003108-09
BEFORE PART: A
JUDGE(S): SKILLMAN
FUENTES

MOTION FILED: JANUARY 29, 2010 BY: SHIELDALLOY METALLURGICAL CORP
ANSWER(S) FILED: MARCH 10, 2010 BY: NJ DEPT./ENVIRONMENTAL PROTECT

FILED APR 12 2010

RECEIVED APPELLATE DIVISION APR 12 2010

SUPERIOR COURT OF NEW JERSEY

SUBMITTED TO COURT: APRIL 01, 2010

O R D E R

THIS MATTER HAVING BEEN DULY PRESENTED TO THE COURT, IT IS ON THIS 9th DAY OF April, 2010, HEREBY ORDERED AS FOLLOWS:

	GRANTED	DENIED	OTHER
MOTION BY APPELLANT - FOR STAY	( )	(x)	(x)

SUPPLEMENTAL: The clerk is directed to establish a briefing schedule that will assure that all briefs are filed before the end of July and to schedule oral argument before October 15th.

GPS

FOR THE COURT:

STEPHEN SKILLMAN P.J.A.D.

JUJAG10

I hereby certify that the foregoing is a true copy of the original on file in my office.

A 278 09

ORDER ON MOTION

IN THE MATTER OF NJAC 7:28

SUPERIOR COURT OF NEW JERSEY
APPELLATE DIVISION
DOCKET NO. A -000278-09T2
MOTION NO. M -004161-09
BEFORE PART: A
JUDGE(S): SKILLMAN
FUENTES

MOTION FILED: MARCH 10, 2010
ANSWER(S) FILED: APRIL 5, 2010

BY: DEP
BY: SHIELDALLOY METALLURGICAL CO.

RECEIVED
APPELLATE DIVISION
APR 12 2010

FILED
APR 12 2010
SUPERIOR COURT OF NEW JERSEY

SUBMITTED TO COURT: APRIL 01, 2010

APR 12 2010
CLERK

O R D E R

THIS MATTER HAVING BEEN DULY PRESENTED TO THE COURT, IT IS ON THIS

9th DAY OF April, 2010, HEREBY ORDERED AS FOLLOWS:

	GRANTED	DENIED	OTHER
MOTION BY RESPONDENT - TO DISMISS THE APPEAL - TO FILE AN OVERLENGTH BRIEF	(x)	(x)	(x)

SUPPLEMENTAL: The motion to file an overlength brief is granted. The motion to dismiss the appeal is denied.

GPS

FOR THE COURT:

STEPHEN SKILLMAN P.J.A.D.

JUJAG10

I hereby certify that the foregoing is a true copy of the original on file in my office.

CERTIFICATE OF SERVICE

I hereby certify, in accordance with Circuit Rule 31, that the original and seven (7) paper copies of the Supplemental Appendix were filed with the Clerk of the Court this 19th day of July, 2012. In addition, on this 19th day of July, 2012, a paper copy of the Joint Appendix was served on each of the following participants in the case by United States first class mail, postage prepaid:

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